YEAR 9 and 10 Animal Enrichment Design Plan

Designing for Animal Welfare and Behavioural Outcomes

Australian Curriculum links

Content descriptions

• AC9TDE10K01 – Analyse how people in design and technologies occupations use design thinking, creativity, innovation and enterprise skills to develop solutions for preferred futures
• AC9TDE10K02 – Analyse how ethical, social and sustainability factors influence design decisions and outcomes
• AC9TDE10P01 – Develop, test and communicate design ideas, processes and solutions, including using modelling and prototyping
• AC9TDE10P02 – Critically evaluate design ideas, processes and solutions against comprehensive criteria for success, including sustainability

Achievement standard (Years 9–10 band)

By the end of Year 10 students analyse how design and technologies occupations innovate and respond to sustainability, ethical and social considerations.

Students generate, design, test and evaluate solutions, and justify their decisions using evidence and criteria for success, including sustainability and functionality.

Sustainability links

• SD1 - Sustainably designed products aim to minimise environmental impact and support ecological systems
• SD2 - Innovative design contributes to more sustainable and ethical ways of living and interacting with animals in managed environments

Learning intention

We will analyse animal behaviour and welfare needs and design, develop, and evaluate a safe enrichment item that encourages species-specific natural behaviours in small primates.

Success Criteria

We will be successful when we:
• analyse at least three natural behaviours of a chosen primate species
• evaluate existing enrichment strategies and identify strengths and limitations
• design and justify an enrichment solution based on behavioural outcomes
• create a functional prototype using safe, sustainable materials
• test and evaluate the effectiveness of the design using observational evidence
• justify design decisions using welfare, safety and sustainability considerations

Timeframe

4–6 lessons plus excursion to deliver and trial enrichment objects

Tuning In Discussion

What is environmental enrichment beyond "toys"?
How does enrichment support animal welfare and behavioural health?
What are the risks of poorly designed enrichment?
How can design decisions impact animal wellbeing?

Whole Class Reading (10 minutes)

Introduce the attached text: *Animal Environmental Enrichment: Primates*

Explore the origin and meaning of the word enrichment and connect to design contexts.

Use a reading strategy (choral, partner, or guided reading).

Check for understanding with the following questions:

1. How does providing animals with choice and control influence welfare outcomes?
2. What behavioural changes indicate successful enrichment?
3. How does enrichment go beyond simply providing food or stimulation?
4. Why must enrichment for primates prioritise cognitive challenge and manipulation?
5. What ethical and safety responsibilities must designers consider when creating enrichment?

2. Research – Behaviour and Enrichment Analysis (30 minutes)

Students research enrichment for:

• Bolivian squirrel monkeys
• Emperor tamarins
• Cotton-top tamarins
• Marmosets

Guided questions:
• What key natural behaviours does this species display in the wild? (e.g. foraging, climbing, social grooming, manipulation)
• What environmental conditions support these behaviours?
• What types of enrichment have been used successfully?
• What are the limitations or risks of these enrichment types?
• How can enrichment provide cognitive challenge, choice and control?

Reputable enrichment websites

• Zoo and Aquarium Association (Australasia) – Animal Welfare
• World Association of Zoos and Aquariums (WAZA) – Animal Welfare Strategy
• Hobart Zoo and Aquarium
• Shape of Enrichment
• Zoo Enrichment Forum

(Teacher note: Students should focus on behaviour-driven enrichment rather than novelty items.)

3. Modelling – Teacher example (10 minutes)

Teacher model: Foraging and manipulation device for small primates

A simple enrichment example is a suspended foraging container made from untreated cardboard, bamboo, or natural fibre materials. Small holes or gaps require the animal to manipulate, reach, or problem-solve to extract food such as mealworms, dried fruit, or seeds.

Explain:

Behaviour encouraged:
This design promotes natural foraging, problem solving, climbing, and fine motor manipulation. Primates must actively engage with the object to access food, replicating wild feeding behaviours.

Materials that can be used:
Non-toxic, untreated materials including:

Cardboard - toilet rolls, paper towel rolls, poster packaging tubes, cardboard boxes (all plastic tape, glue and staples removed)

Natural jute rope, flat or round, old fire hoses

Natural plant materials – pine cones (not pine needles or branches, branches/logs from Australian Wattle and gum trees only, bamboo

Stainless screws may be used during assembly as long as only the head is visible, avoid use on any galvanised screws

PVA Glue – use sparingly

Masking tape

Hobart Zoo and Aquarium will provide chains and rope to hang items on the day of the excursion.

Safety considerations:
Materials must be durable, non-toxic, and free from sharp edges or loose components. The design must prevent entrapment, ingestion hazards, or material breakdown. Items must be checked and approved by zookeepers before use.

4. Designing on paper (30 minutes)

Students complete:
• Annotated design drawing (to scale where possible)
• Labels showing:
o Materials and sustainability choices
o How the animal interacts with the object
o Target behaviour(s)
o Risk and safety considerations

Written justification:
"This design supports the behaviour of… because in the wild this species…"
"This design is effective because…"

5. Plan to make (30 minutes)

Students develop a production plan including:
• Detailed materials list (prioritising safe and sustainable materials)
• Step-by-step construction process
• Risk assessment and safety checklist:

- No toxic materials
- No sharp edges
- No small detachable parts
- No entrapment risks
  • Consideration of durability and reuse

6. Making the object (1–2 lessons)

Students construct their enrichment prototype.

Objects must:
• be structurally sound and durable
• reflect the intended behavioural outcome
• use appropriate, approved materials
• be safe for animal interaction

All items must undergo a **teacher safety check prior to excursion**.

7. Excursion to Hobart Zoo and Aquarium

Purpose

• Apply design solutions in a real-world animal care setting
• Observe behavioural responses to enrichment
• Evaluate effectiveness using evidence

Structure of Excursion

Students bring enrichment items to Hobart Zoo and Aquarium
• Zookeepers inspect all designs for safety and suitability
• Approved items are filled with appropriate food (berries, raisins, nuts, mealworms) and introduced into the enclosure
• A tour of facilities including career opportunities in animal care environments

Pre-enrichment observation:
Students complete a behaviour analyst ethogram before introducing the enrichment to record:
o Activity levels
o Behaviour
o Social interactions

Post-enrichment observation:
Students complete a behaviour analyst ethogram after introducing the enrichment to record:
o Interaction with enrichment item
o Duration and type of engagement
o Behavioural changes (movement, curiosity, problem-solving)
o Any unintended outcomes

8. Reflection and Evaluation (15 minutes)

Students respond to:
• To what extent did my design achieve its intended behavioural outcome?
• What observational evidence supports my evaluation?
• What were the strengths and weaknesses of my design?
• How could the design be improved for increased engagement or safety?
• How did sustainability influence my material choices?

Animal Environmental Enrichment: Primates – Year 9 and 10

Enrichment (noun): improving an experience to make it more complex, stimulating, and meaningful.

Environmental enrichment provides small primates with opportunities to engage in species-specific behaviours such as foraging, exploring, climbing, manipulating objects, and solving problems. These primates are highly active, social, and intelligent, and require daily opportunities to use both their bodies and their minds. Effective enrichment enhances physical and psychological wellbeing, reduces stress, and promotes behavioural diversity.

Figure 1- Bolivian Squirrel Monkeys with pinecone and berry enrichment.

In modern zoological practice, enrichment for small primates is outcomes-based. This means success is measured by observable behavioural changes, not simply by the presence of an object. For example, animals interacting, foraging, climbing, or problem-solving demonstrate effective enrichment. Small primates must be able to exercise choice, control, and cognitive effort, particularly because many species rely on complex thinking and manipulation in the wild.

At Hobart Zoo and Aquarium, enrichment is embedded in daily animal care. Zookeepers design and evaluate enrichment strategies to support the behavioural and cognitive needs of species such as squirrel monkeys, tamarins, marmosets, and capuchins. As a Zoo and Aquarium Association (ZAA) accredited facility, enrichment practices must meet strict animal welfare standards aligned with the World Association of Zoos and Aquariums (WAZA), ensuring animals experience meaningful engagement and opportunities to behave naturally.

Designing enrichment items for small primates requires consideration of:
- animal behaviour and cognition (e.g. foraging, climbing, problem-solving, social interaction)
- material safety and durability (objects must withstand chewing, pulling, and manipulation)
- environmental sustainability (use of safe, reusable, or biodegradable materials)
- ethical responsibility for animal wellbeing (designs must prioritise safety, choice, and positive welfare outcomes)

Small Primate Species Information – Behaviour and Enrichment Focus

Understanding species-specific behaviour is essential for designing effective enrichment. Each primate species has unique feeding, movement and social patterns that must guide design decisions. Ask your teacher for a copy of the fact sheet for the primate species that you will be creating enrichment for.

Bolivian Squirrel Monkeys (*Saimiri boliviensis*)

Bolivian squirrel monkeys are small, highly active primates found in tropical rainforests of South America, particularly in Bolivia, Brazil, and Peru. They are arboreal and diurnal, spending most of their time in the forest canopy moving quickly between branches.

They are omnivores, feeding on fruit, insects, seeds, and small animals. Searching for scattered food sources requires constant movement and problem-solving.

Squirrel monkeys are highly social, living in large groups of up to 40–75 individuals. They show complex social interactions and communication.

Key behaviours to support through enrichment:

- Active foraging and searching for small food items
- Climbing, leaping, and fast movement through space
- Social interaction and group activity
- Exploration and manipulation of objects

Emperor Tamarins (*Saguinus imperator*)

Emperor tamarins are small, tree-dwelling primates recognised by their distinctive long white "moustache." They live in tropical forests of the Amazon basin.

They are arboreal and agile climbers, moving through branches using clinging and leaping behaviours. Their environment is complex and three-dimensional.

Their diet consists of fruit, insects, nectar, and small prey, requiring them to forage across different parts of the forest.

They live in small social groups, showing cooperation and communication.

Key behaviours to support through enrichment:

- Foraging and food searching
- Climbing and vertical movement
- Manipulating objects to access food
- Social interaction within small groups

Cotton-top Tamarins (*Saguinus oedipus*)

Cotton-top tamarins are small primates native to forests in northwestern Colombia and are critically endangered in the wild.

They are arboreal and highly active, moving by running, climbing and leaping along branches.

Their diet is omnivorous, including insects, fruit, sap, nectar and small animals, which they actively search for in the canopy.

They live in close family groups, using a wide range of vocal calls and social behaviours such as grooming.

Key behaviours to support through enrichment:

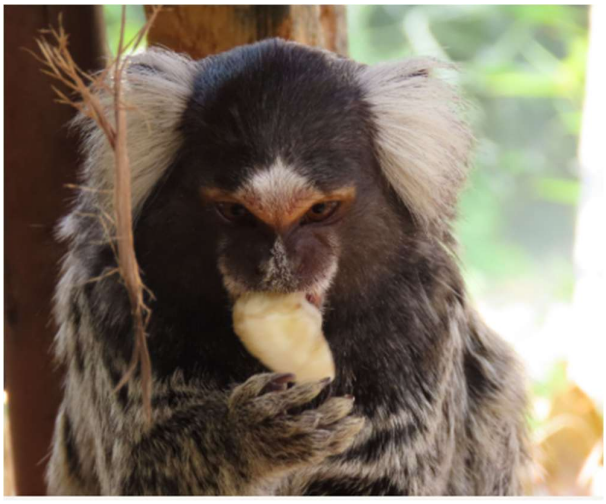
- Complex foraging and food extraction
- Rapid movement through climbing structures
- Social interaction and communication
- Curiosity and exploration

Marmosets (*Callithrix spp.*)

Marmosets are among the smallest monkeys and are native to South America. They are arboreal, fast-moving, and highly adapted to life in trees.

A key feature of marmosets is their specialised feeding behaviour. They eat tree sap (gum), insects, fruit, and nectar, using sharp teeth to gouge holes in bark.

They are social animals, living in family groups and often sharing care of young.



Their claw-like nails allow them to cling vertically and move quickly along branches, similar to squirrels.

Key behaviours to support through enrichment:

- Gouging, probing, or extracting food
- Clinging, climbing, and vertical movement
- Foraging for small, hidden food items
- Social interaction and group engagement

Black-capped Capuchins (*Sapajus apella*)

Black-capped capuchins are medium-sized monkeys found in South American forests. They are highly adaptable and live in a range of habitats including tropical rainforests and dry forests.

They are omnivores, eating fruit, seeds, nuts, insects, eggs, and small animals. Their feeding behaviour is complex and often involves manipulating, breaking, or exploring objects to access food.

Capuchins are among the most intelligent New World primates. They demonstrate advanced cognitive abilities such as problem-solving, memory, and learning through observation. In the wild, capuchins have been observed using tools, such as sticks or stones, to access food or investigate objects, showing flexible thinking and adaptability.

They are highly curious and persistent, often exploring objects repeatedly and testing different ways to achieve a goal. This makes them particularly responsive to enrichment that offers challenge and variation.

Capuchins are also highly social, living in groups with complex hierarchies and frequent interaction, including play, grooming, and cooperation.

Key behaviours to support through enrichment:

- Problem-solving and multi-step manipulation (e.g. opening, twisting, pulling)
- Tool-like interaction with objects
- Complex foraging requiring persistence and effort
- Exploration and investigation of new or changing items
- Social interaction and cooperative behaviours
- Climbing, balancing, and movement through varied structures

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Primate Enrichment Design – Years 9 and 10

Name: Class:

Project Overview:

Create a safe, sustainable enrichment item for a specific, small primate species that encourages natural behaviours through enrichment.

Achievement standard (Years 9–10 band)

By the end of Year 10 students analyse how design and technologies occupations innovate and respond to sustainability, ethical and social considerations.

Students generate, design, test and evaluate solutions, and justify their decisions using evidence and criteria for success, including sustainability and functionality.

Sustainability links

• SD1 - Sustainably designed products aim to minimise environmental impact and support ecological systems
• SD2 - Innovative design contributes to more sustainable and ethical ways of living and interacting with animals in managed environments

Learning intention

We will analyse animal behaviour and welfare needs and design, develop, and evaluate a safe enrichment item that encourages species-specific natural behaviours in small primates.

Success Criteria

We will be successful when we:
• analyse at least three natural behaviours of a chosen primate species
• evaluate existing enrichment strategies and identify strengths and limitations
• design and justify an enrichment solution based on behavioural outcomes
• create a functional prototype using safe, sustainable materials
• test and evaluate the effectiveness of the design using observational evidence
• justify design decisions using welfare, safety and sustainability considerations

Timeframe

4–6 lessons plus excursion to deliver and trial enrichment objects

Research

Project Overview:

Create a safe, sustainable enrichment item for a specific, small primate species that encourages natural behaviours through enrichment.

Species and Behaviour Analysis

Chosen species:

What key natural behaviours does your species display in the wild?	*What environmental conditions support this behaviour?*

What types of enrichment have been used successfully?

Choose one enrichment item to research in detail to complete the table below:

Strengths	Limitations	What would you improve?

Explain how enrichment provides cognitive challenge, choice and control?

Design

Project Overview:

Create a safe, sustainable enrichment item for a specific, small primate species that encourages natural behaviours through enrichment.

My chosen species is……..

Draw and label two diagrams of potential designs.

Design 1- Make sure you include:

- ☐ materials
- ☐ features
- ☐ where the food item will be placed
- ☐ any fixtures to secure it in the animal's habit – these will be provided during your excursion

Design 2: Make sure you include:

- ☐ materials
- ☐ features
- ☐ where the food item will be placed
- ☐ any fixtures to secure it in the animal's habit – these will be provided during your excursion

Final Design Justification

Write 1-2 paragraphs to explain which design you will create as your final product. Make sure you include evidence to justify:
How you predict the animals will interact with the product?
What behaviours your product is planned to reinforce?
Any safety risks associated with your design and how you will overcome these?

You may use the following sentence stems to get you started:
"*This design supports the behaviour of …because in the wild this species…"*
"This feature/design is effective because…"

Production Plan

Material List:

Item	Size	Quantity

Construction Process – Step by Step:

Construction Process – Step by Step (continued):

Safety Risks and Considerations

Create a checklist for you to use upon completion to ensure that your product is safe for your primate species.

Some ideas of what to include in your check list: are the materials non-toxic, are there sharp edges, are there no detachable parts and is there any risk of entrapment of injury.

Make your product

Follow your construction process to create your product.

Remember, your object must:

- ☐ be structurally sound and durable
- ☐ reflect the intended behavioural outcome
- ☐ use appropriate, approved materials
- ☐ be safe for animal interaction

All items must undergo a **teacher safety check prior to excursion**.

Teacher Safety Check:

- ☐ be structurally sound and durable
- ☐ reflect the intended behavioural outcome
- ☐ use appropriate, approved materials
- ☐ be safe for animal interaction

Comments:

Please list any modifications required before the excursion.

I ……. have completed a thorough safety check of

teacher name

…….. enrichment item and it is safe to be shared with the

Student name

nominated small primate species.

Signed: Date:

This page needs to be brought to Hobart Zoo and Aquarium for the excursion, with the enrichment item.

Post-Excursion Reflection

Use your pre-enrichment and post-enrichment ethogram to answer the following questions to reflect on your product.

1) To what extent did your enrichment product achieve it's intended behavioural outcomes?

2) What were the strengths of your design?

3) What were the weaknesses of your design?

4) How could your design be improved for increased engagement or safety?

YEAR 9 and 10 Animal Enrichment Design Rubric - Designing for Animal Welfare and Behavioural Outcomes

Name: **Class:**

Criteria (Australian Curriculum Link)	Working Towards Standard	At Standard	Above Standard	Well Above Standard
Analyse how people in design and technologies occupations use design thinking, creativity, innovation and enterprise skills to develop solutions for preferred futures (AC9TDE10K01)	Identifies 1–2 behaviours with limited or unclear description of how they relate to environment	Describes at least 3 behaviours and explains how they occur in the wild	Analyses 3 or more behaviours and explains links between behaviour, environment, and welfare	Insightfully analyses behaviours, explains interconnections, and evaluates how design supports behavioural outcomes and welfare
Analyse how ethical, social and sustainability factors influence design decisions and outcomes (AC9TDE10K02)	Describes an enrichment example with minimal identification of strengths or risks	Identifies and explains strengths and limitations of an enrichment example	Evaluates strengths, limitations, and risks, including ethical or safety considerations	Critically evaluates and compares enrichment solutions, including ethical, social, safety, and sustainability factors
Develop, test and communicate design ideas, processes and solutions, including using modelling and prototyping (AC9TDE10P01)	Presents a simple design idea with limited connection to behaviour or safety	Develops a functional design and explains how it supports behaviours	Develops a detailed design and justifies decisions using behaviour, safety, and sustainability	Designs an innovative solution and justifies decisions using explicit links to behavioural outcomes, welfare, ethics, and sustainability
Develop, test and communicate design ideas, processes and solutions, including using modelling and prototyping (AC9TDE10P01)	Constructs a basic prototype with limited functionality or safety consideration	Constructs a functional prototype using appropriate materials and safe methods	Constructs a durable and safe prototype using suitable and partially sustainable materials	Constructs a highly functional, durable prototype using safe, sustainable materials with precision and care
Critically evaluate design ideas, processes and solutions against comprehensive criteria for success, including sustainability (AC9TDE10P02)	States a simple opinion about the design with minimal explanation	Explains how the design met its purpose using some evidence	Evaluates effectiveness using observational evidence and suggests improvements	Critically evaluates using detailed evidence, justifies improvements, and explains how changes improve behaviour, safety, and sustainability
Analyse how ethical, social and sustainability factors influence design decisions and outcomes (AC9TDE10K02) *(Sustainability & ethics)*	Identifies basic safety or material issues with limited understanding of sustainability	Describes safety and sustainability considerations in material choices	Explains how sustainability and ethics influenced design decisions	Analyses and justifies design decisions with explicit consideration of sustainability, ethics, and animal welfare outcomes