UNIT PLANNER – Biological Sciences – Multiyear 5-10

Classification of Life
Structure and Function of Living Things

Complied by: Sonia Hankova
Date: August 2015
NT Curriculum: MYL 7-9 Bulman Science /MYL_Science_Year_Level_Plan_Year_7-9%5B1%5D.docx
Rationale

Observation and the ability to identify similarities and differences between different things is a key concept in the study of science. How do we know an organism is alive? How can we describe an organism so that someone on the other side of the world (and who has never seen the organism) will know what it looks like and how it behaves? This unit of work is designed to provide students with hands on visual and practical activities that investigate what characteristics determine whether an organism is living or non-living; examine how the classification of organisms has changed over time and the hierarchy that is currently used (kingdom, phylum, class, family, genus, species). Students will learn and use the scientific conventions for naming and learn to use and make a variety of classification keys.

Students have opportunities to investigate a variety of organisms to determine their physical characteristics and use scientific terminology to describe them. They compare the characteristics of living organisms and use them to describe why fire is non-living. They use the five kingdoms to classify organisms and describe the differences between vertebrates and invertebrates and discuss how DNA technology is causing scientists to re-evaluate this system. They compare the various classes in the phylum Chordata, and use a key to classify an organism accordingly. Students develop their own key to identify their classmates. They discuss the ethics of capturing an invertebrate organism and will then use an online key to identify this organism. Students identify some of the major characteristics that can be used to identify plants.

Aims Standards

By the end of this unit students will be able to: use, distinguish, make, explain

Learning Intentions/Outcomes

Lesson 1:
1. Develop and understanding of scientific thinking and the role of science
2. Identify the characteristics of a living vs. a non-living organism
3. Identify the reasons for classifying organisms
4. Observe the structural changes in plant growth

Lesson 2:
5. Understand the use of classification keys (we will look at two different types)
6. Develop and use different classification keys for a variety of objects

Lesson 3:
7. Identify how the system of classification has developed over time
8. Identify the five major kingdoms that are currently in use in the Linnean system of classification
9. Develop an understanding of the changing nature of scientific classification

Lesson 4:
10. Understand that plants contain green pigment chlorophyll that allows plants to capture sunlight to make their own energy in the form of sugars
11. Conduct an experiment and develop understanding of the scientific method

Lesson 5:
12. Understanding the structure and function of plant parts
13. Conducting a scientific experiment and writing a report – water transport in plants

*Note: each lesson represents 2.5 hours of learning time – due to the flexible and changing nature of the schools programs, this was spread throughout each week as time allowed.

Prerequisites

Students should be familiar with the following topics

Assumed Prior knowledge

The students have not had any previous exposure to science or scientific thinking.
Connections with curriculum and relevant pedagogy

This unit of work is based on careful consideration of the AusVELS science curriculum. Via its learning objectives and outcomes – content, activities, tasks, experiments and assessments – it addresses all areas of Science Understanding, Science as a Human Endeavour and Science Inquiry Skills and at the same time develops all areas of general capabilities (explained in more detail in Unit Rationale section, p.7). This unit utilises the power of an inquiry-based approach to teaching and learning science. It is planned around the 5e’s instructional model (pictured above), based on Bloom’s Taxonomy model (Bloom 1956) – encouraging complex critical though and problem solving skills through application of knowledge and comprehension via evaluating, analysing and creating. This model is interweaved in cyclical fashion throughout this unit of work; placing particular importance on its application though student centered collaborative and cooperative learning, varied activities and tasks that cater for different learning styles, through exciting experiments, open choice research activities and relevant assessments. Inquiry based learning has shown great potential in increasing intellectual engagement and fostering deep understanding through the development of a hands-on, minds-on and research-based disposition. It honours the complex, interconnected nature of knowledge construction, strives to provide opportunities for both the teacher and students to collaboratively build test and reflect on their learning (Madhuri et al. 2012).

The unit allows for learner differentiation through its experiential collaborative-cooperative focus. Student will work in groups allowing them to experience, discover, test, discuss – learn from each other, and teach each other during the process. It allows for varied levels of personal choice with regard to assessments and activities – catering to creativity, research, discussions and application of critical thinking – engaging all senses in a rich and deep explorative dialogue with the learning content. It caters to different learning styles and allows students to take responsibility, drive their own learning at a level suitable to their strengths interests skill and abilities.
## Unit Map

**Year/Class:** MYC 7-9  
**Curriculum Domain:** Science – Biology  
**Title:** Classification of organisms – Structure and Function of Living Things  
**Term:** 3  
**Weeks:** 5

<table>
<thead>
<tr>
<th>Topic title</th>
<th>CLASSROOM PRACTICE</th>
<th>ASSESSMENTS/SUCCESS CRITERIA</th>
<th>RESOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WEEK 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Why do we classify organisms? | Lesson 1 – Learning intentions:  
  • Identify the characteristics of a living vs. a non-living organism  
  • Identify the reasons for classifying organisms  
  Welcome and Intro to New Unit of work – outline learning objectives  
  1. Top 10 New animal discoveries 2015 – YouTube (C) (5:00) GREAT  
  2. Celebrity Heads – using images of different local animals – volunteer to choose a picture from stock of animal cards, class to ask questions that have yes no answers, teacher demo how it works. GREAT  
  3. What is classification? Why do we classify organisms? – Class discussion: grouping based on similar characteristic, dangerous, poisonous, harmless,  
  4. Practical activity I – Communicating scientists – two groups (12 images each) HARD  
  5. Review activity (C) – Discuss the difficulties of early explorers experienced, taking months to travel to new countries to find new plants and animals and writing letters home to describe the animal.  
  6. Brainstorm the characteristic of a living organism, what is the difference between non-living and dead (once living) – How do we know that an organism is alive? – Discuss as class, copy on the reverse of worksheet, make a mnemonic, make note on meaning if necessary  
  1) Exchange gases (breathers air/oxygen from water)  
  2) Water  
  3) Nutrition (food)  
  4) Produce waste  
  5) Grow  
  6) Reproduce  
  7) Respond to stimuli  
  8) Move  
  7. Practical Activity II – Mystery Animals – independent work, then swap (This activity increases students’ observation skills and science literacy)  
  8. Review activity (C) – discuss student responses  
  9. Conclusion – class discussion, watch another video if time |  
  • Prior knowledge  
  • Ability to participate in group discussions  
  • Ability to work collaboratively  
  • Completed worksheets |  
| | | | [https://www.youtube.com/watch?v=GN6a04kVio (9:00)](https://www.youtube.com/watch?v=GN6a04kVio)  
| | | | [https://www.youtube.com/watch?v=B6RaVA1BuR0 (2:45)](https://www.youtube.com/watch?v=B6RaVA1BuR0)  
| | | | • Pictures of organisms found locally in Arnhem Land, NT  
| | | | • PPT and printed  
| | | | • Communicating Scientists  
| | | | • Mystery Animals  
| | | | If there is time to spend another lesson on this do the next two worksheets:  
| | | | Can I survive (as class)  
| | | | Characteristics of fire (as class) |

### Lab Request:
- 4 potatoes and toothpicks  
- glass jars or plastic containers  
- have computers set up ready to go

### Potential for assessment – mini research on animal of choice.
Shantae, William, Norissa
<table>
<thead>
<tr>
<th>Topic title</th>
<th>CLASSROOM PRACTICE</th>
<th>ASSESSMENTS/SUCCESS CRITERIA</th>
<th>RESOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 2 – Learning intention:</td>
<td></td>
<td></td>
<td>Images of different species but same genus – crocodile, turtle</td>
</tr>
<tr>
<td></td>
<td>• Understand the use of classification keys (we will look at two different types)</td>
<td>• Existing knowledge – how much did the students remember from last week</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Develop and use different classification keys for a variety of objects</td>
<td>• Observation – collaborative and independent work</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Review:</td>
<td>• Completed activates and worksheets</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1) What is happening with plants – discuss as groups, refresh water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) What is science and what do scientists do? What is scientific thinking?</td>
<td></td>
<td>Activity 1: fire worksheet</td>
</tr>
<tr>
<td></td>
<td>3) What is biology? What is taxonomy? – Tree of life – how life is related.</td>
<td></td>
<td>Activity 2:</td>
</tr>
<tr>
<td></td>
<td>4) Taxonomy of plants – botany, animals – zoology.</td>
<td></td>
<td>• stationary box – pen, texter, highlighter, USB stick, glue stick, white out, scissors, pencil sharpener, posted notes, paper clips,</td>
</tr>
<tr>
<td></td>
<td>5) Review quote: <em>Science is a way of thinking much more than it is a body of knowledge. Its goal is to find out how the world works, to seek what regularities there may be, to penetrate to the connection of things – from subatomic particles, which may be the constituents of all matter, to living organisms, the human social community, and thence to the cosmos as a whole.</em></td>
<td></td>
<td>• Classification key for the stationary box items</td>
</tr>
<tr>
<td></td>
<td>6) Characteristics of life: How do we know an organism is alive? List the 8 conditions – discuss</td>
<td></td>
<td>Activity 3: New Pamishan Dichotomous key, fun (will take 30-40 min) Bulman Science /Classification Unit/A Key to New Pamishan.docx</td>
</tr>
<tr>
<td></td>
<td>Activity 1 Solo: Worksheet from lesson 1 – Characteristics of fire – YES (10:00)</td>
<td></td>
<td>Activity 3 (easy)</td>
</tr>
<tr>
<td></td>
<td>2. Needs of living things to survive: energy, oxygen, living space habitat (aesthetic, land, trees, air, bush, rainforest, desert) (7:00)</td>
<td>• Book worm worksheet – dichotomous key</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Intro – What would we consider when describing an organism – appearance – structure and features, functions of their parts, habitat, diet, DNA (???) (5:00)</td>
<td></td>
<td>Lab Request:</td>
</tr>
<tr>
<td></td>
<td>4. Show students images of salt water crocodile and fresh water crocodile, couple of different turtle species, two mussels – ask the students to identify the characteristics these have in common and the characteristics that are unique – how do you know they are related? How do you know they are different?</td>
<td></td>
<td>Bring bush tucker book</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pack of cards</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Scissors, glue</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Online resources <a href="http://scienceweb.asta.edu.au/years-7-8/unit2/lesson-two/yr78-unit2lesson-two.html">http://scienceweb.asta.edu.au/years-7-8/unit2/lesson-two/yr78-unit2lesson-two.html</a></td>
</tr>
<tr>
<td>WEEK 2</td>
<td>How do we classify organisms? Using classification keys.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Suggest to the students that scientists need an organised way to identify individual organisms. Ask students how a supermarket or department store organise their products so that shoppers can find them – show trees of life.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td><strong>Activity 2 : Dichotomous key – Pencil case/box of stuff classification (easy) – small groups (try to have 4-6 groups, group strategically) – use stuff from storage room</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td><strong>Review activity</strong> – Discuss how easy this key was to use and if there was any difficulty in classifying objects (e.g. glue and sticky tape)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td><strong>Activity 4: Book Worm</strong> – using a dichotomous key (easy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td><strong>Use the whiteboard make dichotomous key of transport as a class</strong> – <a href="https://www.text2mindmap.com/">https://www.text2mindmap.com/</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td><strong>Conclusion</strong> – discussion: think about how you could classify members of their family (including pets) or items in their bedroom. What characteristics do they have in common? What characteristics do they have the same? Ask what characteristics would they look for in plants or animals?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEEK 3</td>
<td>The 5 kingdoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>---------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesson 3 – Learning intentions:</td>
<td>Existing knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Identify how the system of classification has developed over time</td>
<td>Observation – collaborative and independent work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Identify the five major kingdoms that are currently in use in the Linnean system of classification</td>
<td>Completion of worksheets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Develop an understanding of the changing nature of scientific classification</td>
<td>Prac report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Review – what are dichotomous keys used for? What were the two types of dichotomous keys? How do they work?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Intro – Discussion: spread out a bunch of pictures of monera, bacteria, fungi, plants and animals, ask the students how they would group these</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <strong>Introduce the 5 kingdoms – complete worksheet</strong> and discuss as a class characteristics of each kingdom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Science as a human endeavour – How has the system of classification changed over time? – current Carl Linnaeus – briefly explain how science changes with the advancements of our knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Introduce 7 levels – make a mnemonic, discuss binomial classification, make examples</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Conclusion – complete the Venn Kingdoms worksheet as a class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Practical experiment next class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Check potatoes – discuss evidence of needs</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lab request: as per prac

- Pictures of representations of each kingdom
- 5 kingdoms worksheet
- 7 levels of classification worksheet
- the venn kingdoms
<table>
<thead>
<tr>
<th>WEEK 4</th>
<th>WEEK 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lesson 4 – Learning intentions:</strong></td>
<td><strong>Lesson 5 – Learning intentions:</strong></td>
</tr>
</tbody>
</table>
| • Understand that plants contain green pigment chlorophyll that allows plants to capture sunlight to make their own energy in the form of sugars | • Understanding the structure and function of plant parts
• Conducting a scientific experiment and writing a report
• Review – scientific method
• Intro – talk about plant parts and discuss how plants obtain nutrients – draw on whiteboard
• Inspect and discuss – potato, avocado and onion – needs, how have they changed
• Practical experiment – celery and food dye – testing vascular system of plants
• Plants parts structure – copy drawing from whiteboard and label diagram
• Keep checking the celery –
• Write and finish report – go over as class | |
| Intro – understanding the scientific method:  
• Observation/question – topic for research and experimentation or question that needs to be answered  
• Research – find out about the topic  
• Hypothesis – make a prediction for an outcome to a problem  
• Experiment – develop a procedure to test the hypothesis  
• Collect and record data – record the results of the experiment  
• Analyse data – compare hypothesis and experiment results  
• Conclusion – Report on findings | |
| Practical experiment – What makes plants green? – obtaining chlorophyll from spinach  
Do all plants contain the same amount of chlorophyll? Repeat experiment with potato leaf  
Report on findings | |
| Check potatoes – discuss evidence of needs | |

**Existing knowledge**

**Observation – collaborative and independent work**

**Completion of worksheets**

**Prac report**

**Lab request:**

**Chlorophyll extraction - chromatography**

- filter/chromatography paper
- scissors
- baby spinach leaf
- coin
- jar
- sticky tape
- glass
- plastic wrap
- pencil
- rubbing alcohol

**Celery experiment worksheet**

**Prac report template worksheet**

**Lab request:**