Creating Science – the needs of living things

How do we create an accurate and helpful understanding of the needs of living things?

#CreatingScienceTheNeedsOfLivingThings

Suggested Outcomes

(NOTE: This is by no means an exhaustive list of possible outcomes, neither is it intended that ONLY these outcomes can or should be met. Science is a deeply interrelated activity, and you may find cross curriculum links you can and should use.)

Science content

- Biological sciences F: Living things have basic needs, including food and water
- Biological sciences 3: Living things can be grouped on the basis of observable features and can be distinguished from non-living things

Science inquiry skills

- Communicating 3: Represent and communicate observations, ideas and findings using formal and informal representations (ACSIS060)

Science as a human endeavour

- Nature and development of science 3: Science involves making predictions and describing patterns and relationships (ACSHE050)

Science vocabulary words

Tier 1 (Everyday words) animal, pet, wild animal. Living, unliving.

Tier 2 (dual meaning)

- Need: something absolutely necessary for something else to occur. For example, you need air to stay alive. We often use this word in regular speech with a fair degree of hyperbole. For example, you arguably do not need wifi or friends or entertainment to simply stay alive.

Tier 3 (Specialised vocabulary)

- Biology: the study of living things.
- Habitation: the kind of places one particular kind of animal likes to live.
- Once living: a creature that was one alive, but no longer is, such as the wood in a chair.
- Never living: something that is considered as having no life, such as a rock or metal chair.

Warning

- Live animals are unpredictable and potentially dangerous. Use all appropriate care, and acquire professional assistance where possible.

Preparation

- Bring along a living thing, a pet or favourite plant will do. Make sure that living things has everything it needs to be safe, healthy, and comfortable.

Suggestions for other year levels

As always, more material is presented here than can be used by the average class during the average lesson time. However, since the students questions can and should guide student learning, more material is presented for you convenience. Remember, it is not uncommon for students to only remember those points which answered their personal questions.

Younger:

This activity is usually well suited to this age group, but you will want to give parents and students a heads up – phobias of certain animals can scaffold unwanted behaviour in other students.

Children at this age can underestimate potential dangers of living creatures, and must be managed carefully. Most modern cinematic and movie literature greatly over exaggerates animals intelligence and, indeed, benevolence. Be sure to remind students that these are *real* animals.

Middle:

This activity is well suited to this age group, and lends itself to having students and parents bring in favourite pets to show and tell.

Teen:

A trip to a zoo or dangerous plant exhibit can greatly enhance and diversify interest in biology. The needs of life given here are *very* simplistic – challenge students to gain a greater understanding of the needs of living things beyond 'air, food, water, shelter.'

Learning Intent (student friendly)

'We are learning to' (WALT) – understand the needs of living things.

Success criteria

'What I'm looking for' (WILF) – a clear ability to distinguish between needs and wants for biological survival.

Student learning goals

Help students make a self-monitored learning goal for this lesson.

Evidence of learning

How will you know when the learning goal is achieved? What EVIDENCE do you have that your students have met or exceeded the learning expectations?

1. They can safely handle themselves in the presence of living things, including plants that live around the educational venue.
2. They can list the needs of living things, and distinguish between biological needs and wants.

Engage

Introduce some living animals to the students.

Be sure to manage student behaviour carefully, and to warn them of all safety risks.

Explore

Ask: What are the needs of this living thing, in particular, what does this living being need and do in order to stay alive?

Ask: What qualities to *all* living things need to be alive?

Explain

What are the needs of all living things?

⇨ Get a sheet of paper and brainstorm all the things students think living things need to stay alive, don't censor ideas; creativity is called for.

Guide students into seeing that there are at least four main areas of the needs of living things (below):

Basic needs

- Food
- Water
- Shelter
- Air

How does this animal's behaviour or adaptions help it achieve these basic needs?

Elaborate

How can we tell living animals from non living animals?

We can ask Mrs Gren

⇨ Move
⇨ Respire

- ⇨ Sense
- ⇨ Grow
- ⇨ Reproduce
- ⇨ Excrete
- ⇨ Need nutrition

Ask – are these qualities sufficient and successful at helping you define 'living' from 'non living'?

Adaption

Ask: What adaptions do the living creature have here today that helps it to survive?

For example, Rabbits;

- Have large ears to pick up subtle sounds
- Have nervous and cautious personalities; very easily startled. They also will often not leave the familiar burrow without pausing to sniff for potential threats, even if they've left there a thousand times before.
- Have large eyes for seeing danger, placed on the sides of their heads to scan a broad range of their environment for trouble, including the sky.
- Have developed the 'thump' reflex to warn burrow buddies of impending trouble.
- Have a fur coat to keep warm. It sheds to help keep them cooler at other times of the year.
- Have a very dangerous protective attitude towards their home burrow. They may bite if they are in their 'home' and aren't approached carefully!
- They enjoy the company of other rabbits, but will flee for their own lives if threatened.

Advanced needs of living things – high school

We've touched on what science currently agrees to be the basic needs of living things, but are there more?

- Air pressure. No living thing we know of exists without pressure to hold it together.
- Gravity field? All living things we know of exist in a gravity field. When they develop in microgravity, they sometimes cannot develop normally at all. We know of no living things native to 0 gravity environments... but could they?
- Energy. Plants get their energy from the sun, but they get their matter to make new leaves from the air and from the water in the ground. They use trace minerals in the water to help make the complex molecules of life. Yet we have discovered deep see extremophiles that do not need sunlight. No life form we know of exists without energy.
    - Photosynthesis is chemically the reverse of respiration. Oxygen and fuel = water, carbon dioxide and energy.
- Oxygen? Well plants need oxygen too! However, during the sunlight they make more oxygen than they need, so overall release oxygen. But they **use oxygen too**!
    - But not all living things need oxygen! Some microbes are abiotic, and we recently found multicellular creature that don't need it either! http://www.scientificamerican.com/podcast/episode/multicellular-life-found-that-doesn-10-04-09/ or http://phys.org/news189836027.html

- ‘Shelter’ is a very broad category. Some animals clearly shelter inside the bodies of other animals…

Evaluate

Formative: Discuss the needs of living things, and how their favourite creature finds what it needs to survive.

Food for thought:

- What might happen if this animal has unlimited food and no natural predators in its environment?

More about animals

- The four main needs of living things are air, water, food and shelter.
- But are they? Should there be more? Do all living things need these four?
- Find and document the needs of your favourite living thing.

Assessment

Prior Learning:

Take time to focus on planned content material during the engage phase, for example,

- What are the needs of living things?
- What are the differences between living and nonliving things?

Focus on the outcomes – how can we create the BEST scientific knowledge?

Be sure to watch out for the following common alternative conceptions[1]:

- All moving things are alive, such as clouds or lightning. Also, things that don’t move such as barnacles, incubating eggs, or trees are not alive.
- Humans aren’t animals. In science, humans may be considered a kind of animal.

Encourage scientific, rather than poetic, thinking when discussing living and nonliving things.

Formative:

As students are learning, help them self-monitor their own learning and achievements.

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1 http://www.education.vic.gov.au/school/teachers/teachingresources/discipline/science/continuum/Pages/livingthings.aspx taken 11 may 2018, for some excellent extension activities with regards to this topic

Summative:

Help students consider ways they can communicate their new understanding to others, just as scientists need to do. Invite students to prepare a report regarding their favourite animal.

- What are its needs for life?
- Year 4 – where does it need to live? What does it need in its environment to be safe?
- Year 6 – were does it fit in the food web?
- Year 9 – what threats to its environment may cause the animal to become engaged, or even more endangered? What can be done about these threats?

So what?

Living things need other things to stay alive.

Living things have adaptations that help them to get the things they need to stay alive.

Creating science

Science as a human endeavour

- Nature and development of science 3: Science involves making predictions and describing patterns and relationships (ACSHE050) – as we explore the patterns and qualities that make up a species.

Science content

- Biological sciences 3: Living things can be grouped on the basis of observable features and can be distinguished from non-living things – as we explore the needs of living things, and their bodily features that help them achieve those needs.

Science inquiry skills

- Communicating 3: Represent and communicate observations, ideas and findings using formal and informal representations (ACSIS060) – as we share our observations and understandings of animals and their features.

The needs of living things

Your name:

Your favourite animal