Science

Understanding about science

Living World – Ecology

Introduction

It's a great time to explore the world!
You will hear many stories through the media and also by listening to others talk on environmental challenges about what our world faces right now which can, at times, be scary but also incredibly exciting.

All living things, including humans, have adapted to our environment. The way we look, the way we behave, how we are today, and our way of life did not just happen magically. It is a long process of survival, reproduction, and learning to live in an ever-changing habitat we call earth. The way humans and other living things live is constantly changing in response to both natural and human-caused environmental changes. Sometimes for the better, and sometimes for the worst.

In your exploration, you will find out how living things around us have adapted to their environments, and how they respond to changes in their habitats.

First Framework (lesson)

What is ecology?
Ecology is the relationship between living things and their environment. For example, how do you behave on a cold winter night sleeping outside in the open air compared to being snuggled in bed at your warm, comfortable home? Do you think you will change as a person if you had to live outside all the time? The answer is probably, yes. Your skin will become thicker; you will get used to the change in temperatures and learn to eat different food. The food may have an impact on your general health for better or worse. Your body will be interacting with organisms and the environment in different ways to help you survive. Sometimes the environmental changes can be too harsh for the body to cope, this could lead to the extinction of a species, even humans!

Make an observation

Being curious about the world around you and constantly challenging how you and others think is a healthy way of approaching your exploration in science.

You will need to become a careful observer and a curious learner.

Things to think about

- Have you noticed any changes happening around the world where the environment is causing living things to change?
- What are some of these changes?
- Why do you think these changes are happening?
- Are these changes healthy or harmful? Why?
- What interests you and makes you wonder?
- Talk to others who are interested in this type of conversation and explore your ideas together

Check the examples section for the "habits of mind" this stage of your inquiry focuses on. Habits of mind direct your thinking so that it is productive and creative (only available within YouPlanIt Classroom).

You are a budding scientist who is taking notice of things you have seen, heard, smelt, tasted or touched in your world! **Follow your gut instincts; they will lead you!**
Scientists are curious about the world. They make observations that lead to experiments or an investigation and use these to explain the world around them.

A scientific investigation can come to light when we experience something intriguing or surprising that makes us curious. Now is the time to think and experience the world around you with all of your five senses.

Tasks

- Find something to study which involves the interactions of living organisms and their environment
- You could watch a video, a documentary, or read about an existing experiment online that makes you wonder. You will be lead to question, challenge, create, and want to know MORE!
- Upload your thoughts into YouPlanIt Classroom

This first step of your scientific inquiry can seem quite overwhelming, and it's okay if you're feeling unsure of where to begin.

Check the examples section for ways you can narrow down your observations into a research question that will direct your inquiry, (only available within YouPlanIt Classroom). You have access to this even if your teacher is a non-paying subscriber as long as they have created an account for you).

Second Framework (lesson)

Research Your Problem

Now is the time to undertake some deep, wide, honest research.

Tasks

- Think back to your "I see, I wonder" chart from the previous framework.
- Decide on your “Big” question
- Your research question should be about a problem, a wondering, or building on something that scientists already know that caught your interest
- Write down what you could read about, get advice about and make more focused observations on your chosen science question.
- Collect articles, books, online links, etc. to find information that is already available to help answer your “Big” question.

Scientists use what they already know about science and evidence from experiments to build new understandings. A good scientist will convert general wonder and curiosity into a focused investigation or inquiry.
This is what you will be doing too!

Check the examples section for great question starters that will help you research your problem or wondering deeply and widely.

Remember, these questions might change, and that's okay! Science knowledge is dynamic and changes when new evidence or ideas present itself.
Check the examples section for a handy way to organise questions so that you know how to start your research.

Third Framework (lesson)

Develop a Hypothesis

You need to have your research question for your scientific inquiry by now. The next step is to make a prediction (hypothesis) that you can prove (or disprove) through an experiment!
So what is a hypothesis?
A hypothesis is to guess an answer to your question, that can be researched and explored. Your hypothesis is what you think will happen from your research question.

It doesn't have to be right or wrong - the point of a hypothesis is to turn science ideas into a prediction that can be investigated. **Check the examples section within YouPlanIt Classroom** for examples of a hypothesis.

Task

- **Look** at your hypothesis so far and list three good reasons why you have made this prediction.
- **What** makes you think so?
- **How** could you check that?
- **How** can you back yourself and your reasons?

Collaborate with your classmates, teachers and science experts to hypothesise, predict and ask more questions. Learn to tolerate uncertainty!

At this point, you won't have all of the answers, and that's okay. You might be unsure of what to expect, and the best part about science is that it can surprise or shock you when you least expect it!

Fourth Framework (lesson)

Design an Experiment to test your Hypothesis

It's time for you to design and carry out an experiment to test your ideas!

You will be a focused, well-planned and careful observer. Have an open mind at this stage - anything is possible, and you might find your hypothesis is met or challenged!

What is an experiment? An experiment is a scientific test or tests that you do, and you will carefully observe to learn something about your world.
Here are some steps to follow as you plan your experiment. Scientists have to make sure that their experiment is well-rounded, is related to their hypothesis and is also fair.

Check the examples section to find out more about what a fair test is.

Tasks

Pick out four questions from this list, and write your answer to them.

- What are you trying to find out?
- What's the most measurable, fair and realistic way to test your hypothesis?
- What kind of data can you collect? Your data could be an observation or a physical piece of evidence.
- What variables are there, and how will you measure these? **Check the examples section** to find out what a variable is before you go any further.
- What will you be looking for?
- What evidence do you expect to find?
- How could you begin to record your observations and collect data?
- Where could your experiment lead to?
- What resources to do you need to complete your experiment?

Remember that an experiment could be done in an hour or completed over a couple of weeks. It depends on what you are investigating and what the best way to collect data is. Always check in with your learning coach.

The most important thing is that your experiment will allow you to gather data that will help prove your hypothesis to be right or wrong.

Be patient and have an open and critical mind. Talk to your classmates, teachers and science experts for advice on creating the best experiment possible for your scientific inquiry.

Fifth Framework (lesson)

Organise your Data

It is important to spend some time organising your data to make sense of it all. There is no point in gathering a lot of data only to jump to conclusions

You have to ask yourself

- What does my data mean to my experiment and my hypothesis?
  There are a lot of ways that you can organise your data in science, and it all depends on the nature of your inquiry!

Tasks

- **Experiment** with different ways of organising your data and see what gets your findings across in the best way.

- **Use** a bar graph, a pie chart, a table, a series of photographs or a tally chart.

Check the examples section for more on this. Think outside the box and talk to your learning coach and friends. Are you organising your data in a way that makes sense and will help answer your hypothesis or question?

Your science mind is growing, and you're finding out new things about the world!

Sixth Framework (lesson)

Analyse your data and draw conclusions

Now is the time to bring your hypothesis, research, experiment, data, and science knowledge together to create a big, new understanding.

Tasks

Answer these questions

- Was your hypothesis correct or incorrect?
- Was there anything in your data that surprised you?
- What action could you take now?

Check the examples section for more about how to share your ideas

Now is the time to be honest, have an open and critical mind.
Have class and group discussions so that you can explore your ideas, make your thinking clear, think about different options and challenge ideas.

When you build shared understandings through a learning community, it is easier to organise your thoughts and develop a big, final understanding of your inquiry.

More tasks

Here are some steps you can follow as you begin to organise your data.
Remember to look closely for **patterns or relationships** that might tell you something important
Learning through a scientific inquiry is all about making connections!

- **Look** back at your questions at the start of your inquiry**.** Can you use your data to answer the questions that relate to your hypothesis?
- **Think** about anything that seemed usual in your findings - have you found anything that surprised you? How could you use problem-solving skills to explain this? Remember the answer might be beyond your scientific knowledge, and that's okay! Give it your best shot, and make an educated guess.
- **Explain** what you have discovered**.** You could look back to brainstorming and mind mapping to organise these explanations.
- **Respond** to misconceptions - check the examples section for more about what a misconception is. Revisit your data - could it be explained differently?

Seventh Framework (lesson)

Make A Model

Once you have looked at and thought about your data, you can draw conclusions by making a model.

What is a model?

A model is a way of showing an idea, an object or a process to explain your experiment, data, and findings.

This is a way to explain science knowledge that can be difficult to put into words.

Make your model

- A model doesn't have to be a 3D sculpture of your science idea! It could be photos, a diagram or a picture too. This is a very important part of helping you and others to understand your science knowledge.
- Scientific models are representations that should create interest in developing a deeper knowledge and communicating scientific ideas.
- Models are important to scientists in proving and disproving their ideas.
- Models are made, thrown away, or remade to make ideas more easy to understand
- Models can explain an idea or make a prediction. For example, models are used to predict outbreaks of diseases, climate change, and interactions within an ecosystem.

Tasks

- Make a model of your science inquiry. This will help others understand your thinking and explain what you have learned.

Because models are simply predictions or representations of real objects, systems or events, they are always being reworked and questioned by scientists as they gain new knowledge and question old ideas and understandings.

Check the examples section on how to begin to make a model for your scientific inquiry.

Eighth Framework (lesson)

Make Evaluations

It's time to revisit your hypothesis.
Now that you have looked carefully at your data and made sense of it all, you can explain what you know against your hypothesis.

Tasks

Answer these questions

- Was your hypothesis proven, or disproved?
- What surprised you?
- What met your expectations?
- What would you do differently next time?

Now is the time to think "so what?" What does this all mean, and what does it mean for you as a budding scientist?

- What difference does your scientific inquiry make to people?
- Who might be interested in what you have done? Would it be your school, your family or business?
- What could this lead to? What could you do next?
- What new questions do you have?
- What would you do differently next time to gather better data?
- Did you get all your questions answered?
- What do you wonder about, that might lead to your next scientific investigation.?

Having spent so much time on this project will have developed your brain and caused you to think critically about the world around you.

Welcome to the world of scientists!

Key Competencites for reflection, evaluation or assessment

Key Competencies – Thinking

4th Level

I have spent significant time reflecting on the world around me and how our environment is changing as a result of human influence. I have developed a greater awareness of how my actions can influence the health of our planet for better or worse.

3rd Level

I have spent some time reflecting on the world around me and how our environment is changing as a result of human influence. I have developed a greater awareness of how my actions can influence the health of our planet for better or worse.

2nd Level

I didn't spend enough time reflecting on the world around me and how our environment is changing as a result of human influence. I have developed a greater awareness of how my actions can influence the health of our planet for better or worse.

1st level

I haven't spent time reflecting on the world around me and how our environment is changing as a result of human influence. I have little understanding of how my actions can influence the health of our planet for better or worse.

Key Competencies – Thinking

4th Level

I am aware of how my life is interchangeable with the environment and that we both have an impact on each other. I understand that my decisions have an impact on the wellbeing of my family, friends, community, and society as a whole.

3rd Level

I have some awareness of how my life is interchangeable with the environment and that we both have an impact on each other. I understand that my decisions have an impact on the wellbeing of my family, friends, community, and society as a whole.

2nd Level

I have little awareness of how my life is interchangeable with the environment and that we both have an impact on each other. I have little understanding of how my decisions have an impact on the wellbeing of my family, friends, community, and society as a whole.

1st level

I have no awareness of how my life is interchangeable with the environment and how we both have an impact on each other. I have no understanding of how my decisions have an impact on the wellbeing of my family, friends, community, and society as a whole.

Key Competencies – Thinking

4th Level

I often reflect on my learning, ask questions and challenge my assumptions about life on our planet and seek better ways of showing respect to all living things.

3rd Level

I sometimes reflect on my learning, ask questions and challenge my assumptions about life on our planet and seek better ways of showing respect to all living things.

2nd Level

I spend little time reflecting on my learning, ask questions or challenge my assumptions about life on our planet and sometimes seek better ways of showing respect to all living things.

1st level

I don't reflect on my learning, ask questions or challenge my assumptions about life on our planet and generally don't seek better ways of showing respect to all living things.

Key Competencies – Using language, symbols, and texts

4th Level

I am confident in using language, symbols, and text to communicate my understanding of how living things have adapted over time to the environment.

3rd Level

I have growing confidence in using language, symbols, and text to communicate my understanding of how living things have adapted over time to the environment.

2nd Level

I have little confidence in using language, symbols, and text to communicate my understanding of how living things have adapted over time to the environment.

1st level

I have no confidence in using language, symbols, and text to communicate my understanding of how living things have adapted over time to the environment.

Key Competencies – Using language, symbols, and texts

4th Level

I am confident in communicating my ideas, thoughts, and possible solutions by using words, number, images, movement, and technologies in a range of different ways.

3rd Level

I have growing confidence in communicating my ideas, thoughts, and possible solutions by using words, number, images, movement, and technologies in a range of different ways.

2nd Level

I have little confidence in communicating my ideas, thoughts, and possible solutions by using words, number, images, movement, and technologies in a range of different ways.

1st level

I have no confidence in communicating my ideas, thoughts, and possible solutions by using words, number, images, movement, and technologies in a range of different ways.

Key Competencies – Managing self

4th Level

I am highly motivated to set personal goals that allow me to meet the environmental challenges we face in our world today.

3rd Level

I am motivated to set personal goals that allow me to meet the environmental challenges we face in our world today.

2nd Level

I am a little motivated to set personal goals that allow me to meet the environmental challenges we face in our world today.

1st level

I am not motivated to set personal goals that allow me to meet the environmental challenges we face in our world today.

Key Competencies – Managing self

4th Level

I am resourceful and reliable in my approach to learning and manage my projects with resilience to get the best possible results.

3rd Level

I am mostly resourceful and reliable in my approach to learning and sometimes manage my projects with resilience to get the best possible results.

2nd Level
At times I show resourcefulness and reliability in my approach to learning and mostly manage my projects with resilience to get the best possible results.

1st level
I rarely show resourcefulness or reliability in my approach to learning and rarely manage my projects with resilience to get the best possible results.

Key Competencies – Managing self

4th Level
My work reflects a willingness to lead, work independently or follow others to establish plans, manage projects and meet challenges.

3rd Level
My work sometimes reflects a willingness to lead, work independently or follow others to establish plans, manage projects and meet challenges.

2nd Level
My work shows little evidence of my willingness to lead, work independently or follow others to establish plans, manage projects and meet challenges.

1st level
My work doesn't show a willingness to lead, work independently or follow others to establish plans, manage projects and meet challenges.

Key Competencies – Relating to others

4th Level
I have a keen awareness of how my relationship with my environment helps shape who I am today.

3rd Level
I am aware of how my relationship with my environment helps shape who I am today.

2nd Level
I have some awareness of how my relationship with my environment helps shape who I am today.

1st level
I have little awareness of how my relationship with my environment helps shape who I am today.

Key Competencies – Relating to others

4th Level

I recognise how my actions can change the environment but also how the environment changes me.

3rd Level

I sometimes recognise how my actions can change the environment but also how the environment changes me.

2nd Level

I have little understanding of how my actions can change the environment but also how the environment changes me.

1st level

I don't understand or recognise how my actions can change the environment but also how the environment changes me.

Key Competencies – Relating to others

4th Level

I demonstrate a willingness to listen to others even if their ideas and beliefs are different to my own. By listening to others, it allows me to think differently and come up with new ideas.

3rd Level

I demonstrate some willingness to listen to others even if their ideas and beliefs are different to my own. By listening to others, it allows me to think differently and come up with new ideas.

2nd Level

I demonstrate a little willingness to listen to others even if their ideas and beliefs are different to my own. By listening to others, I know it allows me to think differently and come up with new ideas.

1st level

I demonstrate no willingness to listen to others, accept their ideas or beliefs especially if they are different to my own.

Key Competencies – Relating to others

4th Level

I am very open to new learning by including others who have very different backgrounds to my own and appreciate their different points of views. I can respectfully negotiate and share ideas without compromising my authenticity and honesty.

3rd Level

I am open to new learning by including others who have very different backgrounds to my own and appreciate their different points of views. I can respectfully negotiate and share ideas without compromising my authenticity and honesty.

2nd Level

I am sometimes open to new learning by including others who have very different backgrounds to my own and appreciate their different points of views. I can respectfully negotiate and share ideas without compromising my authenticity and honesty.

1st level

I am not open to new learning by including others who have very different backgrounds than I. I don't appreciate different points of views. I am usually disrespectfully in negotiating and never compromise my authenticity or honesty.

Key Competencies – Relating to others

I am aware of how my words and actions affect others. I know when it is appropriate to compete and when it is appropriate to co-operate. I am beginning to understand how this also applies to the environment I live in.

3rd Level

I am sometimes aware of how my words and actions affect others. I know when it is appropriate to compete and when it is appropriate to co-operate. I am beginning to understand how this also applies to the environment I live in.

2nd Level

I am sometimes aware of how my words and actions affect others. I sometimes know when it is appropriate to compete and when it is appropriate to co-operate. I am beginning to understand how this also applies to the environment I live in.

1st level

I have little awareness of how my words and actions affect others. I don't know when it is appropriate to compete and when it is appropriate to co-operate.

Key Competencies – Participating and contributing

4th Level

I am actively involved in my community (this could include family, friends, and school) creating awareness of our responsibility to live in harmony with each other and our environment.

3rd Level

I am involved in my community (this could include family, friends, and school) creating awareness of our responsibility to live in harmony with each other and our environment.

2nd Level

I have little involvement in my community (this could include family, friends, and school) creating awareness of our responsibility to live in harmony with each other and our environment.

1st level

I have no involvement in my community (this could include family, friends, and school) creating awareness of our responsibility to live in harmony with each other and our environment.

Key Competencies – Participating and contributing

4th Level

I am aware that I have a responsibility to contribute to the sustainability of social, economic and natural environments. I know they all relate to each other in some way.

3rd Level

I have some awareness of my responsibility to contribute to the sustainability of social, economic and natural environments. I have some understanding of how they all relate to each other in some way.

2nd Level

I have little awareness of my responsibility to contribute to the sustainability of social, economic and natural environments. I have little understanding of how they all relate to each other in some way.

1st level

I have no awareness of my responsibility to contribute to the sustainability of social, economic and natural environments. I don't understand how they relate to each other.

Key Competencies – Participating and contributing

4th Level

I feel a sense of belonging to my community and natural environment and with my new learning seek to contribute in some small way to make life better for living things.

3rd Level

I feel some sense of belonging to my community and natural environment and with my new learning seek to contribute in some small way to make life better for living things.

2nd Level

I feel little sense of belonging to my community and natural environment, and I'm not sure how my new learning can contribute to making life better for living things.

1st level

I feel no sense of belonging to my community or natural environment, and I don't know how my new learning can contribute to making life better for living things.

Please adopt your flair for writing and modify to suit your needs! We hope this will be helpful.