Home Learning TV: Middle Science

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| **Segment lesson planning details** |  |
| Title for segment: | Science and innovation  |
| Year levels *(**e.g. Yrs1 – 3)*: | 4-6 |
| NZC learning areas:  | Nature of science: Identify ways that scientists work together and provide evidence that supports their ideas; appreciate that science is a way of explaining the world and knowledge changes over time |
| Purpose of lesson:(What learners will learn) | To explore interactions between science and innovation |
| Success Criteria – students will be able to:(how they will know when they have learnt it) | Tamariki will be able to describe some attributes of inspirational peopleTamariki will be able to describe some examples of innovation Tamariki will begin to develop an understanding of the value of mātauranga Māori, innovation and science |
| **Segment production details** |
| Equipment requirements: | PPT Spife and Biospife and kiwifruit |
| Copyright requirements:Please be specific: Source: (*Seven Sizzling Sausages* by Sam Smith –url link to the source), intended use (to demonstrate alliteration), Length (timings for video clips) | All images and video provided in the media zip folder below have been cleared for use  |
| **Segment links and attachments *(list all links to recordings or attachments, the source and confirm that copyright permissions are granted)*** |
| Links to recordings /resources |  |
| Attachments  |  |
| **Segment plan content** |
|  | Teaching and learning activities linked to purpose | High level script (key points/questions)  |
| **Activate**: Activating prior learning, knowledge of contexts and relationships | Introduction, making connections and setting the scene.Helping tamariki and whānau switch into science mode, and to start thinking about the role of science in innovation. SLIDE 2: with the words ‘Inspiring people’ | Kia ora koutou! Talofa lava! How are you today? [Introduction and general catch up.]Today I’m looking forward to introducing you to some amazing people - scientists, kaipūtaiao, and technologists who are working on some pretty important research and are inspirational, innovative and entrepreneurial. And they all live here in Aotearoa New Zealand! Before we start, do you have a science book or a piece of paper to write on and a pen or pencil to write with? [Create a pause for viewers to get their paper and pen - presenter could use a biospife to cut and taste some kiwifruit to help avoid dead time; alternatively, the presenter could flip through a photo album or book of photos of famous people, depending on the resources available at home]So, let's start by thinking about some you think is inspiring.Write a title in your book or on your paper - ***‘Inspiring people’***, then write their names down under it. Who is on your list? They don't have to be famous; they can be someone you know - someone in your whānau, or at school, or in a sports team. [Presenter to identify 1-2 scientists they know, and talk about what they find inspiring. Please try to make a link with innovation - the new ideas that these inspiring people are generating / contributing to. If the person is someone famous, we can help to source an image. However, we know that the presenter has worked with a range of scientists and likely has personal images that might be used.][Presenter to add someone else - a family member / teacher from when at school as a boy, or a colleague now … link this to a personal attribute - always encouraging me to do my best, or to look for solutions, or not to give up, etc.] Who did you have on your list? If it’s someone you know, maybe you can tell them that you think they’re inspiring - I know that this would absolutely make their day! |
| **Learn**: Introducing learningReinforce routines, provide multiple exposure to concepts, and strategies. Scaffolding learning  | Making connections.SLIDE 3: Words on a slide:Inspiration [arrow] innovationSLIDE 4: About innovation videoVimeo link: https://vimeo.com/599986660Filename:MS\_05\_About innovation.mp4[The videos used here are sourced from the SLH - <https://www.sciencelearn.org.nz/videos/772-the-biospife-story> - this may provide the presenter with useful background.]SLIDE 5: Plastic spife Filename: MS\_05\_ScienceAndInnovation\_PlasticSpife.jpegSLIDE 6: Introduction to the biospifeVimeo link: https://vimeo.com/599941783Filename: MS\_05\_Biospife\_1\_Introduction.mp4 SLIDE 7: BiospifeFilename: MS\_05\_ScienceAndInnovation\_BioSpife.pngSLIDE 8 Biospife part 2 – wet biomass Vimeo link: https://vimeo.com/599941827Filename: MS\_05\_Biospife\_Part2\_Wet\_biomass.mp4SLIDE 9: Biospife part 3 ChallengesVimeo link: https://vimeo.com/599969298Filename: MS\_05\_Biospife\_3\_Challenges.mp4SLIDE 10: Biospife part 4 – WhyItWorksVimeo link: https://vimeo.com/599941860Filename: MS\_05\_Biospife\_4\_WhyItWorks.mp4SLIDE 11: Longfin eelFilename: MS\_05\_ScienceAndInnovation\_LongfinEel.jpg SLIDE 12: Glass eelsFilename: MS\_05\_ScienceAndInnovation\_GlassEels.jpegSLIDE 13: Glass eel research videoVimeo link: https://vimeo.com/599953847Filename: MS\_05\_Glass eel research.mp4SLIDE 14: Video What makes reef noise?Vimeo link: https://vimeo.com/599955799Filename: MS\_05\_What makes reef noise.mp4SLIDE 15: Taewa in keteFilename: MS\_05\_ScienceAndInnovation\_TaewaInKete.jpegSLIDE 16: Nik weighing potatoesFilename: MS\_05\_ScienceAndInnovation\_NikWeighingTaewa.jpeghttps://www.sciencelearn.org.nz/images/872-weighing-taewaSLIDE 17: Mussel lines recutVIMEO LINK: https://vimeo.com/599986834FILE NAME: MS\_05\_Mussel\_lines recut.mp4 | Inspiration comes from all sorts of people - and all sorts of ideas.Today, we’re going to be exploring the inspiration that leads to innovation.But what’s innovation?Well, I’m glad you asked.[play video][Presenter to pull out key ideas from the video* Innovation can be about big changes or small changes
* It might be a new idea, or an improvement to something that already exists
* It can lead to new products, or new processes

Often, science and innovation are linked together. Let’s have a look at three different examples. Here’s the first one. [Show image of spife]We actually saw it in the video we’ve just seen - it’s called a spife - can you guess why? It’s a combination of a spoon and knife. Pretty handy, really. [Pick up the spife and kiwifruit and do some acting.]So, the spife was designed for eating kiwifruit. It was designed and made by Zespri - Zespri is New Zealand’s growing and marketing kiwifruit company.The idea to make a spife is pretty innovative.I like it - it’s small and very usable. What a great innovation!But what was the problem? The problem was the material it was made from - plastic - a non-recyclable plastic! Let’s find out what happened next. [play video - spife 1]So Zespri, the kiwifruit company, partnered with SCION, which has scientists and technologists who specialise in using wood and other biological materials. As a team, they came up with the biospife [show image] - a spife made from kiwifruit waste.Let’s find out more about the story of the biospife! [Video - biospife 2]WOW - so they used the rejected kiwifruit from the pack house to make a plant-based material that has similar physical properties to plastic but that will break down and compost. SCION had to do a lot of development to make a machine that could turn kiwifruit residues into a bioplastic solution. In the video they use the word Bioplastic - let’s just clarify that a bit more. Plastics are materials that have properties that are lightweight and mouldable into different shapes. This is what makes them so useful. Most common plastics are made out of fossil-fuels like petroleum/oil or natural gas. There are two problems with this - one is that the oil or petroleum source is non-renewable - it will eventually run out. And the second is that the plastics don’t ever break down completely, making them an environmental problem. That’s why many bioplastics are more appealing - they are made from natural more sustainable sources, because we can keep growing them - like kiwifruit. They can also be commercially compostable, and break down without harming the environment like other plastics do. Like with all innovations, there were some challenges along the way.[Play video - biospife 3][Presenter to talk about the need for testing when developing a new product]Let’s watch the last video. [Play video - biospife 4]So, a pretty key ingredient of success is that consumers like using the product.You also had a team of people with the right skills and equipment who came together to collaborate on a solution. Do you think you could design a tool that could help solve an issue or just make life easier or better? I bet you could! To keep us feeling inspired, let’s look at another innovation - something completely different to the biospife! Have a look at this image - do you recognise it? If you said tuna [check pronunciation at maoridictionary.co.nz] or eel you are right! New Zealand has two eel species – the long-fin and short-fin. This is the longfin. You can tell that because it’s dorsal fin, that’s the fin on the top, comes further forward than the anal, or bottom, fin. Longfin eels are mysterious, secretive creatures, and legendary climbers - they can wriggle up waterfalls and even some dam walls. They breed only once, at the end of their long life, after a swim of thousands of kilometres to spawn in the ocean somewhere near Tonga, never to return.They’re also big - they can grow up to 2 metres long. E tu, stand up - Let’s try to work out how long two metres is. Find somewhere to mark where you’re standing, then take two big steps. That’s around about 2 metres.[Presenter to model this movement]Unfortunately, tuna numbers are declining. This is because of overfishing, and because the places where they live are being polluted or destroyed. Fewer eels are also successfully making it to their breeding area near Tonga, so fewer elvers - young eels - are drifting back to New Zealand.For years, Ngāti Awa and other iwi have been helping eels to bypass river obstacles by guiding them into traps and transporting them up or downstream by hand. Now, as the obstacles get bigger, Ngāti Awa is combining mātauranga - Māori knowledge - and science to create an innovative model for a sustainable eel industry. Together with knowledge gathered at hui attended by scientists and commercial eel exporters from around New Zealand, they will come up with innovations to restore the tuna fisheries. Their goal is to have a sustainable export industry, customary fishing and a growing eel population existing alongside each other.Let's listen to Erina Watene-Rawiri talk about her research. Before we watch it, I need to show you this [image - glass eel] - this is a glass eel, it’s a really, really young eel, one of the first stages in the eel lifecycle. Let’s now watch the video. [Play video] So Erina and her colleagues were combining modern methods for catching and counting the glass eels, and comparing the findings with previous research. Here’s another innovation - this is also of a research tool, and it’s used to investigate sound under water.That’s an interesting idea, don’t you think?Like, why would we want to know about sounds under water?Dr Craig Radford is investigating whether animals use underwater sounds to navigate. He’s wanting to know if human-made sounds are affecting animals living in the ocean.To measure the sound underwater he uses a hydrophone.[Play video] What did you think of that? Had you thought about the noises under the ocean before? So - let’s think - we’ve seen science and innovation going hand in handto develop the biospife, to explore growing glass eels in tanks, and to investigate sounds under the sea.Hey, do you like potatoes? Potatoes are so good - you can mash them, roast them, boil them, fry them and they make great potato chips! Have you heard of taewa? [Show image] They are a special type of potato.Taewa have significant cultural and historical value in Aotearoa. Traditional varieties of taewa have been preserved by Māori and passed down through generations so they’re still available today in their original form. Māori treasure them as a link to their tūpuna, their ancestors.[Optional, depending on time]I want to introduce you to Dr Nick Roskruge. Here he is weighing some tawea. [show image]Nick is pretty inspirational! He left school at 14 and worked as a pruner in different fruit orchards. He went to study when he was an adult and is now an agronomist - he is an expert on crop production systems and soils. He also is a professor and researcher and is passionate about tawea and mātauranga, or Māori knowledge! His inspirational message is that careers can take many different pathways - so take up those opportunities when you can.Dr Nick has established Tāhuri Whenua, an organisation that supports Māori growing taewa and other traditional Māori crops such as kūmara and kānga. Regular hui brings the growers together to share information and resources. This is helping Māori improve crop yields and train younger people as well as creating new opportunities for Māori horticulture. He has created a seed bank for the different varieties of tawea so they will not be lost. Ka pai Nick![Optional, depending on time]Before we go, here’s one last story about inspiration and innovation. If you watched the previous episode, you’ll recognise it. It’s a story about mussels, kūtai. Well, kūtai farming to be exact. Mussel farmers grow mussels on long ropes in the ocean. Usually, these ropes have a plastic base to them - but Kaipūtaiao Kura Paul-Burke and her team have been investigating using natural fibres to make the mussel lines. Let’s have a look. [Show video] [Wrap up chat about the video and the innovation involved.] |
| **Respond**: Providing opportunities to use and practice  | Recapping the session, repeating and reinforcing the inspiration and innovation aspects.Inviting viewers to consider their own futures, and the role that innovations may play.  | Thinking about the people we have met today, what do you think are the things they all have in common? I think they are all trying to solve a problem.* the biospife was developed as a plastic alternative
* the story about the tuna was focused on finding a way to grow tuna in captivity and then release them back into the wild
* the hydrophone helps ocean scientists to learn more about noise in the ocean, and investigate the impacts of human activity like ships and drilling in the ocean.
* Nick wanted to make sure the mātauranga about tawea wasn't lost
* and Kura and her team were looking for natural materials that could be used for mussel lines.

They are all inspirational and they are all New Zealanders. I wonder whether you sometimes think about what job you might have in the future - maybe one of the scientists featured in this episode has inspired you to learn more about pūtaiao, science. Maybe you could write or draw some ideas about what you want the world to look like when you’re an adult - it might be something that you’re doing, or it might be something about the world - a new invention, perhaps.  |
| **Share**: Learner and parent reflection on learning and engagement and what they can do next | A final opportunity to reflect on the episodeSLIDE 18: SLH Logo | When you think back about some of the people we’ve talked about today, I wonder who your favourite was, and why?Mine was Erina and the tuna - I didn’t know about glass eels before I started planning this episode, and I love that there are so many people tracking our native taonga and using the information to inform conservation decisions. I have enjoyed this time with you e hoa, I hope you have enjoyed our time together, too.[Shout out to the Science Learning Hub for support planning this episode] Until next time, ka kite ano. |