AQUACULTURE

Ministry for Primary Industries
Manatū Ahu Matua

Approaches to Social Inquiry – New Zealand Pacific oysters.

THE ROLE OF IWI IN THE PRODUCTION AND MANAGEMENT OF AQUACULTURE.

ESSENTIAL QUESTION

Can a Pacific oyster in a New York restaurant represent the values of an entire iwi?

WHAT ARE WE LEARNING?

- Understand how people make decisions about access to and use of resources;
- Understand how ideas and structures are used in different texts to communicate meaning;
- Understand the reach of the global reputation of the New Zealand Pacific Oyster industry.

TRY THIS WITH

- Year 7-10;
- Students who have a strong interest in Te Tiriti o Waitangi;
- Students who love analysing and investigating.

FIND

Identify
Label
Cite
Give examples
Match
Ask

Identify values that the class or the school adhere to.

Discuss the idea that our values are evidenced by: the things we do; our stories; our artwork; our memories; and even our food.

Support students to make connections by thinking about underlying ideas.

Read "The Seahorse and the Reef" by Witi Ihimaera - discuss why the characters were so upset.

Introduce the idea that the sea and its well-being are strongly connected to the identity of Maori.

Support students to find a map of their local coastal community.

Identify the local iwi and unpack local place names with meanings connected with the sea.

Research other connections between your local iwi and the sea.

Use thinglink to make the image rich with video, photographic, and reference-based links.

APPLY

Connect
Identify
Group
Establish
Reason
Research

Support students to review key elements of Te Tiriti o Waitangi.

Use the Fact Sheet to review key elements of the Maori Commercial Aquaculture Claims Settlement Act 2004.

Discuss with students why they think the MCACS was required.

Use Evernote and Skitch to create a Case Study of Aotearoa Fisheries Limited involvement in the Pacific Oyster industry.

Introduce the key maori values of Rangitiratanga (leadership), Whanaungatanga (family), Tohungatanga (expertise) and Kaitiakitanga (stewardship).

Use Popplet to review and analyse the case study collaboratively. Identify the key maori values in action within the case study.

PRODUCE

Compile
Speculate
Experiment
Validate
Infer
Prove

Review the Yellow Brick Road statement on sustainability.

Yellow Brick Road CEO, Rachel Taulelei said recently that "Maori are perfectly placed to be leaders in presenting New Zealand Seafood to the world".

Aotearoa Fisheries want to report back to their partner iwi regarding their global reputation for providing New Zealand farmed Pacific Oysters to the world.

Use tagboard to initially identify consumers via hashtags such as #pacificoysters #nzseafood and #kaimoana.

Identify who, at a global level, is selling, eating, preparing, wishing for and even missing pacific oysters.

Use easel.ly to create an infographic that can be used by Aotearoa Fisheries to demonstrate both market leadership and opportunity to its iwi partners.

SUCCESS CRITERIA

Students can demonstrate their learning by:

- Creating a thinglink that is varied and innovative in its research links;
- Identifying how ideas (including Maori values) and structures are used to communicate meaning in the case study;
- Submitting an infographic that uses evidence to demonstrate global reach.

PRINCIPLES	VALUES	KEY COMPETENCIES	LEARNING AREAS	WORD BANK	RESOURCES REQUIRED
Te Tiriti o Waitangi Future focus	Ecological sustainability Equity Excellence	Using language, symbols and text Relating to others	Social Science (L3) English (L3)	Tohungatanga Pacific oyster Sustainability MCACS	Fact Sheet The Seahorse and the Reef - Witi Ihimaera Key Maori Values What is a Case Study?

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Ecology: How are living things suited to their particular habitat?

USING MINECRAFT TO UNDERSTAND THE CONCEPT OF EFFICIENCY IN AQUACULTURE.

ESSENTIAL QUESTION

Could Old MacDonald farm the Ocean?

WHAT ARE WE LEARNING?

- Conducting investigations using the statistical enquiry cycle;
- Recognise that there are processes common to all living things and that these occur in different ways;
- The concept of efficiency through the context of the aquaculture industry.

TRY THIS WITH

- Year 6-9;
- Students who have an interest in finding the maths in real world examples;
- Students who love thinking about world issues.

FIND

Summarise
Recall
Locate
Tell
Report
Explain

Assign students individual online farming games and support them to identify common processes of living things in each game.

Watch Just the Job and make a list of the skills needed to be a farmer.

Split the class into three groups (sheep, sheep and beef, beekeeping).

Create a thinglink to explain the type of farm in detail.

Support students to identify the key concepts listed on the Activity Plan.

Share each group's thinglink.

Introduce the concept of efficiency using the Feeding the World infographic in this article. Watch the Greenshell™ mussel efficiency video and look at the examples of efficiency in aquaculture.

Discuss "Can you farm the ocean?"

View Just the Job - Salmon Farming.

Repeat the thinglink as a class focusing on salmon farming.

APPLY

Analyse
Difference
Compare
Reframe
Estimate
Solve

Review the concept of a Feed Conversion Ratio.

Create a continuum of efficiency the length of the classroom.

Ask students to use their knowledge to predict a level of efficiency for each farm.

Photograph students standing at the point on the continuum that reflects their prediction.

Review the Feeding the World infographic and check predictions.

Photograph the students standing at the actual point of efficiency for each farm.

Instagram or tweet a photo showing prediction and outcome side by side.

Use the Fact Sheet to find the FCR of farmed salmon.

Investigate what can affect the efficiency of a salmon farm.

Contact hello@schoolkit.co.nz with the results of the activity.

PRODUCE

Compile
Reframe
Give reasons
Elaborate
Justify
Plan

Refresh your own learning by reviewing current minecraft practice in education.

Support students to create a farm in minecraft. They will need to integrate the elements of farming identified in the first activity into a working minecraft farm.

Choose both land and ocean based farms but ensure you have a mix of both.

Students should be encouraged to think about their environment, what they are feeding their animals and how they are feeding their stock to ensure the most efficient farm.

Suggested minecraft mods include FishandFarm, FishingNets, Agent's Agriculture, Aquaculture and MagicFarm but be aware that new mods are constantly added.

Once all class farms are functioning, students should create a tour of their farm highlighting key decisions made in the management and reflecting on the level of efficiency achieved.

SUCCESS CRITERIA

Students can demonstrate their learning by:

- Creating a thinglink that identifies the process of living things on any farm;
- Investigating efficiency and documenting predictions based on learning;
- Creating a video that summarises strengths and weaknesses of an individual student created minecraft farm.

PRINCIPLES	VALUES	KEY COMPETENCIES	LEARNING AREAS	WORD BANK	RESOURCES REQUIRED
Learning to learn Future focus	Equity Ecological sustainability	Using languages, symbols and text Thinking Participating and contributing	Mathematics and Statistics (L3)	Conversion Efficiency Salinity Feed Conversion Ratio (FCR)	Fact sheet How to Farm the Ocean Activity Plan Efficiency in Aquaculture video Feeding the World infographic article

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Identifying Solutions - planning the sustainable development of a resource.

INVESTIGATING THE POTENTIAL FOR THE NEW ZEALAND AQUACULTURE INDUSTRY TO CONTRIBUTE TO THE GLOBAL DEMAND FOR PROTEIN.

ESSENTIAL QUESTION

Can New Zealand Aquaculture help save the world?

WHAT ARE WE LEARNING?

- How to generate and test ideas, refine concepts, select, produce, and evaluate outcomes;
- Understand how people participate individually and collectively in response to challenge;
- The process of future proofing the New Zealand aquaculture industry.

TRY THIS WITH

- Year 7-9;
- Students who have an interest in global issues;
- Students who love problem solving.

FIND

Identify
Summarise
Select
Infer
Read
Define

Refresh your own learning by reviewing the concepts behind future problem solving.

Watch the Aquapod video, the WWF clip and the Ocean Acidification video, support students to read the WWF article to start them thinking about the success and challenges of the global aquaculture industry.

View the Greenshell™ mussels research video and discuss their solutions to the problems.

View the Scenario card.

Ask each group to:

- Find all the problems they see in the scenario and record using Popplet;
- Assess the problems and decide on the one that is the most important to solve;
- Come up with six ideas that will solve the chosen problem.

Remind students that the ideas should be creative but realistic and will require research into aquaculture innovation and practices.

Introduce Basecamp for each group to use as a collaborative workspace.

APPLY

Interpret
Prioritise
Choose
Reason
Connect
Compare

Help the group identify which of their ideas best solves their chosen problem.

Compile a set of criteria questions in Basecamp.

Use question starters such as:

- Which idea is the most...?;
- Which idea will be best at...?;
- Which idea will mean the longest...?

Go through each one and select the idea that best fits the question. If there is disagreement, each person can present their case and a majority vote wins.

Identify the idea that has been selected the most times in answer to the criteria questions.

Brainstorm how each idea could be actioned.

Choose the idea that generates the best brainstorm.

PRODUCE

Explain
Combine
Elaborate
Invent
Assess
Debate

Develop an action plan that gives a detailed explanation of how the best idea will work to solve the problem from the Scenario Card.

Keep the ideas based on reality but encourage students to create new jobs, titles, government departments, funding, gadgets etc.

Use Screenr or iMovie to present these action plans.

Include videos of the groups' discussions, relevant images and anything else that ensures the idea is well explained.

Compare and evaluate each group's ideas as a class.

Discuss the pros and cons of each one.

Could two ideas be combined into one to make a super idea?

SUCCESS CRITERIA

Students can demonstrate their learning by:

- Identifying relevant problems within the Scenario;
- Creating solutions that effectively solve their chosen problem;
- Explaining how their solution will work in a detailed action plan.

PRINCIPLES	VALUES	KEY COMPETENCIES	LEARNING AREAS	WORD BANK	RESOURCES REQUIRED
Future focus High expectations	Innovation, inquiry and curiosity	Managing self Thinking Relating to others	Social Science (L3) Technology (L3-4)	Acidification Selective breeding Omnivore Omega-3s	Aquapod video Ocean Acidification video WWF Clip Fact Sheet

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Life Processes: Understanding how we can influence an outcome.

HOW DO WE ENSURE EFFICIENT FOOD PRODUCTION AND IMPROVED SURVIVAL RATES?

ESSENTIAL QUESTION

What are the chances of becoming a tween in the salmon world?

WHAT ARE WE LEARNING?

- Investigate simple situations that involve elements of chance;
- Explore how the groups of living things we have in the world have changed over long periods of time;
- Calculating salmon survival rates in both wild and farmed environments.

TRY THIS WITH

- Year 6-8;
- Students who have an interest in investigating and comparing;
- Students who love displaying data in a visual way.

FIND

Label
Observe
Trace
Illustrate
Show
Review

Complete the Ted-Ed 'Resiliency among the Salmon People' to understand the origins of King Salmon as a species.

Introduce the idea that Salmon are not native to New Zealand.

Ask: "How might Salmon have got to New Zealand?"

Explain that New Zealand King Salmon have been given a Seafood Watch green rating and that part of the reason for this is because the species is not native to NZ.

Use the Pinterest research starter for King salmon life processes.

View The Salmon Dance and Salmon Get Schooled.

Use Timetoast to create a timeline for the life cycle of King salmon.

Include these terms: eye up, smolt, fry and harvest.

APPLY

Identify
Arrange
Calculate
Classify
Compare
Research

Introduce the concept of probability.

Watch this Probability video.

Demonstrate the concept using a large number of red counters and a single yellow counter in a jar.

Ask: "What do you think the chances are of pulling a yellow counter out of the jar?"

Introduce a numerical problem to be solved by the class:

"Of a 1000 King Salmon eggs how many do you think will survive to 'tweenhood'?"

Record the prediction as a percentage using DestructingMessage.

PRODUCE

Predict
Estimate
Compare
Elaborate
Measure
Evaluate

Ask: "What factors do you think will lessen the probability of King Salmon surviving until they are a tween?"

View the Pinterest board and A Different Kettle of Fish for ideas.

Encourage students to include the following ideas:

- how many eggs do you think will survive?
- what percentage of eggs will make the fry stage?
- which are the predators that might harm the salmon?
- how many fry will make the smolt stage?

Combine key concepts of probability with research on the salmon life cycle to create a statistical calculation.

Add additional points of calculation for each part of your Timetoast.

Calculate a final survival rate. View the predictions made earlier and see who was correct.

Use tessellation to create a visual representation of the overall survival rate of salmon.

SUCCESS CRITERIA

Students can demonstrate their learning by:

- Correctly identifying the characteristics and life events of both wild and farmed salmon and how these have changed over time;
- Creating an accurate representation of salmon survival rates;
- Explaining how probability affects an outcome.

PRINCIPLES	VALUES	KEY COMPETENCIES	LEARNING AREAS	WORD BANK	RESOURCES REQUIRED
Community engagement Learning to learn	Innovation, inquiry and curiosity Ecological sustainability Integrity	Using languages, symbols and texts Participating and contributing Relating to others	Mathematics and Statistics (L3) Science (L3)	Prediction Percentage Survival rate Representation	Fact Sheet Probability video The Salmon dance video A Different Kettle of Fish video

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Exploring Innovation - creative solutions to real life industry problems.

INNOVATION AND PROBLEM SOLVING TO MEET THE NEEDS OF A GROWING AQUACULTURE INDUSTRY.

ESSENTIAL QUESTION

Who wears the stockings in the aquaculture industry?

WHAT ARE WE LEARNING?

- Identifying ways that scientists work together and provide evidence to support their ideas;
- Understand that technological outcomes are recognisable as fit for purpose by the relationship between their physical and functional natures;
- The aquaculture industry is a community of innovative problem solvers.

TRY THIS WITH

- Year 5-8;
- Students who have an interest in creating and designing;
- Students who love working collaboratively.

FIND

Match
Locate
Listen
Interpret
Record
Identify

Explain that using innovation to solve problems is part of working in the aquaculture industry and it relies on scientists working together.

Use the Salmon Farming video to identify an example of innovation in King salmon farming.

Identify the key phrases that each of the kids share in the following 'Kids React' movies; Walkmans and Rotary Phones.

Distribute the mystery aquaculture objects and the name of that object, e.g. christmas tree rope, dropper, mussock, mussel spat hatchery, floats, byssal thread, barge.

Ask each group to find out; what their object is; how it is used; how it works; what it is made from; and which type of aquaculture it is associated with. 'How mussels are farmed' will help.

APPLY

Interview
Organise
Connect
Summarise
Simplify
Select

Explain that students are going to replicate a Kids React video using their mystery aquaculture objects.

Conduct and film interviews with students from another group.

Show them the picture of the mystery object and ask:

- Do you know what it is?;
- What is it called?;
- Which aquaculture type is it associated with?;
- Can you explain how it works?

Edit the interviews to mimic a Kids React movie.

Include an explanation describing what the object is, what it is used for, what need it addresses and how it works.

Share each movie with the class so that everyone becomes familiar with each aquaculture innovation.

PRODUCE

Develop
Elaborate
Evaluate
Design
Theorise
Solve

Discuss with students that some people think mussel farming affects the look of coastlines.

Challenge students to come up with an innovative solution for making a mussel farm that floats under the water and isn't visible from above. Ideally the method of farming shouldn't change.

Review the Fact Sheet.

Consider the following:

- What is the current structure of a mussel farm?;
- How far underwater will it need to be so that it isn't seen?;
- How could it stay under water but not sink?;

Use SketchUp to complete the design.

Create a thinglink with the final design.

Add a voiceover explaining the design and how it solves the visual problem that some people don't like to look at mussel farms.

SUCCESS CRITERIA

Students can demonstrate their learning by:

- Producing a Kids React movie showcasing an innovation in aquaculture;
- Completing a design that shows knowledge of how mussels are farmed;
- Explaining how and why their design works and solves the visual effects of mussel farming.

PRINCIPLES	VALUES	KEY COMPETENCIES	LEARNING AREAS	WORD BANK	RESOURCES REQUIRED
High expectations Coherence	Innovation, inquiry and curiosity Ecological sustainability	Using language, symbols and texts Thinking	Technology (L3) Science (L3)	Stocking Visual pollution Backbone Droppers	How mussels are farmed video Fact Sheet Photos of mystery aquaculture objects