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Materials and Processing Technology

Revised Subject Learning Outcomes

Author: Stephanie O'Sullivan

Technology Learning Area Lead

Email: Stephanie.OSullivan@education.govt.nz

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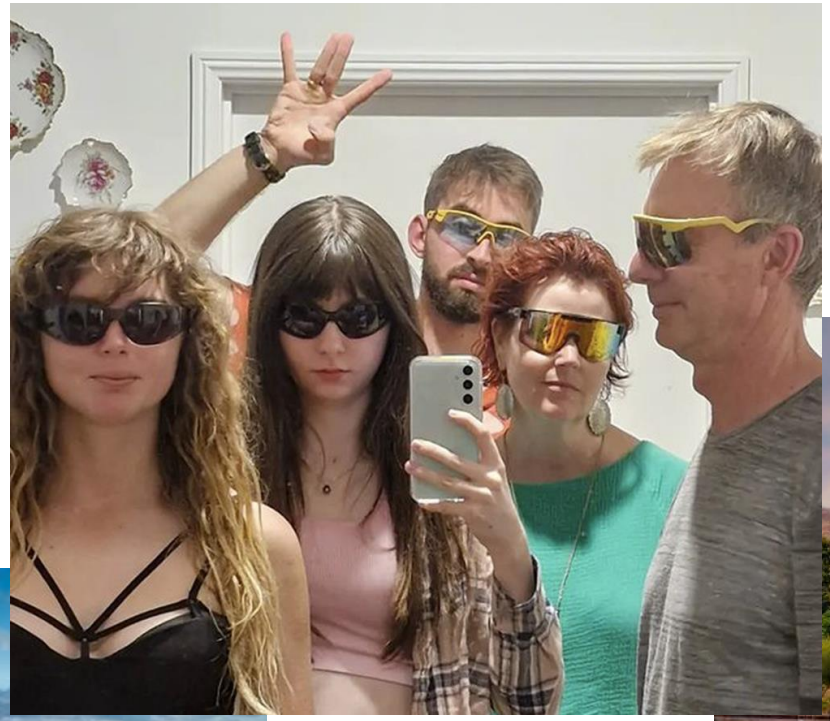
Ministry of Education



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Programme planning
What is a Subject Learning Outcome (SLO)?
The revised SLO's – what are the updates?
Using the SLO – how could I use the revised SLO's?

Programme planning:

1

Whakataukī

-What meaning does the whakataukī have for you and your learning area?
-How will you keep it in your line of sight during course development?

2

Big Ideas

-Unpack the BI's
-What are you doing already?

3

Significant Learning

-how can these be grouped to form the foundations for a project?

4

Teaching and Learning Guide

- Unpacks the LM, subject key competencies, potential student pathways, and cross subject links

5

Course Outlines

- *How can you use the course outline as a starting point for your course development?*
- *Contextualise for your own ākonga*

6

Assessment Activities

- Which AA's will be most engaging for my ākonga.

7

Unpacking the standards

- Unpack the detail of the standard

8

Achievement standards

-How will evidence for assessment fall out of the programme learning?
-How will this evidence be captured?
-What digital fluency skills do my ākonga need?

Subject Learning Outcomes:

Programme Planning

After planning, use S.L.O. to check that the programme covers the learning ākonga need to be successful

Ākonga engage with the teaching and learning programme.

Ākonga are ready to be assessed

Prior to assessment event, use S.L.O. to check ākonga are able to achieve the standard

Assessment Event

Materials and Processing Technology Learning Matrix

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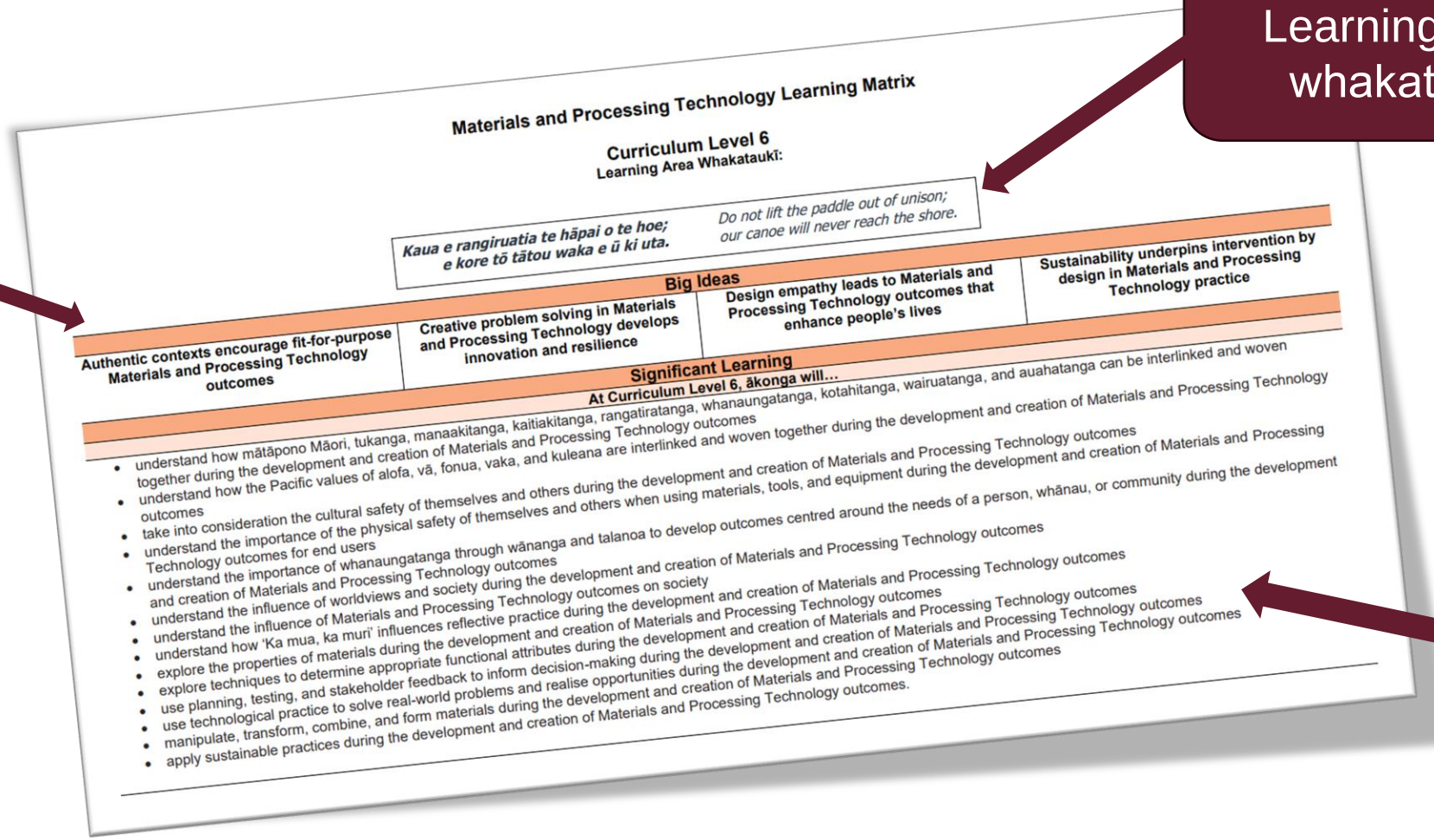
Technology Learning Area whakataukī

Subject Big Ideas

Significant Learning – the not to be missed learning



Materials and Processing Technology Learning Matrix

Curriculum Level 6
Learning Area Whakataukī:

Kaua e rangiruatia te hāpai o te hoe; e kore tō tātou waka e ū ki uta. *Do not lift the paddle out of unison; our canoe will never reach the shore.*

Big Ideas

Authentic contexts encourage fit-for-purpose Materials and Processing Technology outcomes	**Creative problem solving in Materials and Processing Technology develops innovation and resilience**	**Design empathy leads to Materials and Processing Technology outcomes that enhance people's lives**	**Sustainability underpins intervention by design in Materials and Processing Technology practice**

Significant Learning

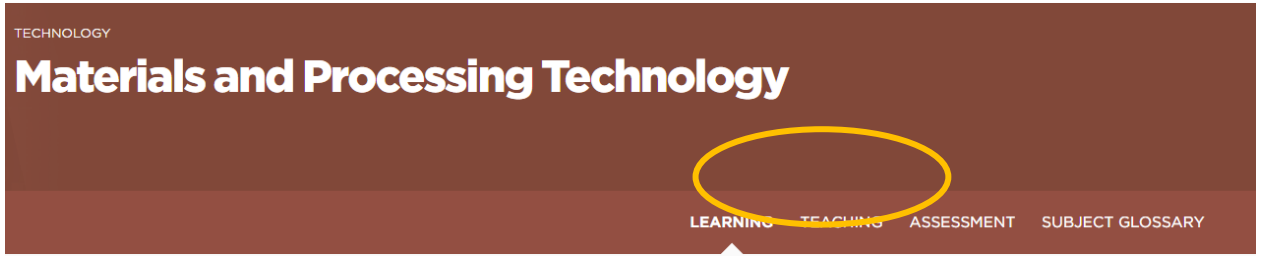
At Curriculum Level 6, ākonga will…

- understand how mātāpono Māori, tukanga, manaakitanga, kaitiakitanga, rangatiratanga, whanaungatanga, kotahitanga, wairuatanga, and auahatanga can be interlinked and woven together during the development and creation of Materials and Processing Technology outcomes
- understand how the Pacific values of alofa, vā, fonua, vaka, and kuleana are interlinked and woven together during the development and creation of Materials and Processing Technology outcomes
- take into consideration the cultural safety of themselves and others during the development and creation of Materials and Processing Technology outcomes
- understand the importance of the physical safety of themselves and others when using materials, tools, and equipment during the development and creation of Materials and Processing Technology outcomes for end users
- understand the importance of whanaungatanga through wānanga and talanoa to develop outcomes centred around the needs of a person, whānau, or community during the development and creation of Materials and Processing Technology outcomes
- understand the influence of worldviews and society during the development and creation of Materials and Processing Technology outcomes
- understand the influence of Materials and Processing Technology outcomes on society
- understand how 'Ka mua, ka muri' influences reflective practice during the development and creation of Materials and Processing Technology outcomes
- explore the properties of materials during the development and creation of Materials and Processing Technology outcomes
- explore techniques to determine appropriate functional attributes during the development and creation of Materials and Processing Technology outcomes
- use planning, testing, and stakeholder feedback to inform decision-making during the development and creation of Materials and Processing Technology outcomes
- use technological practice to solve real-world problems and realise opportunities during the development and creation of Materials and Processing Technology outcomes
- manipulate, transform, combine, and form materials during the development and creation of Materials and Processing Technology outcomes.
- apply sustainable practices during the development and creation of Materials and Processing Technology outcomes

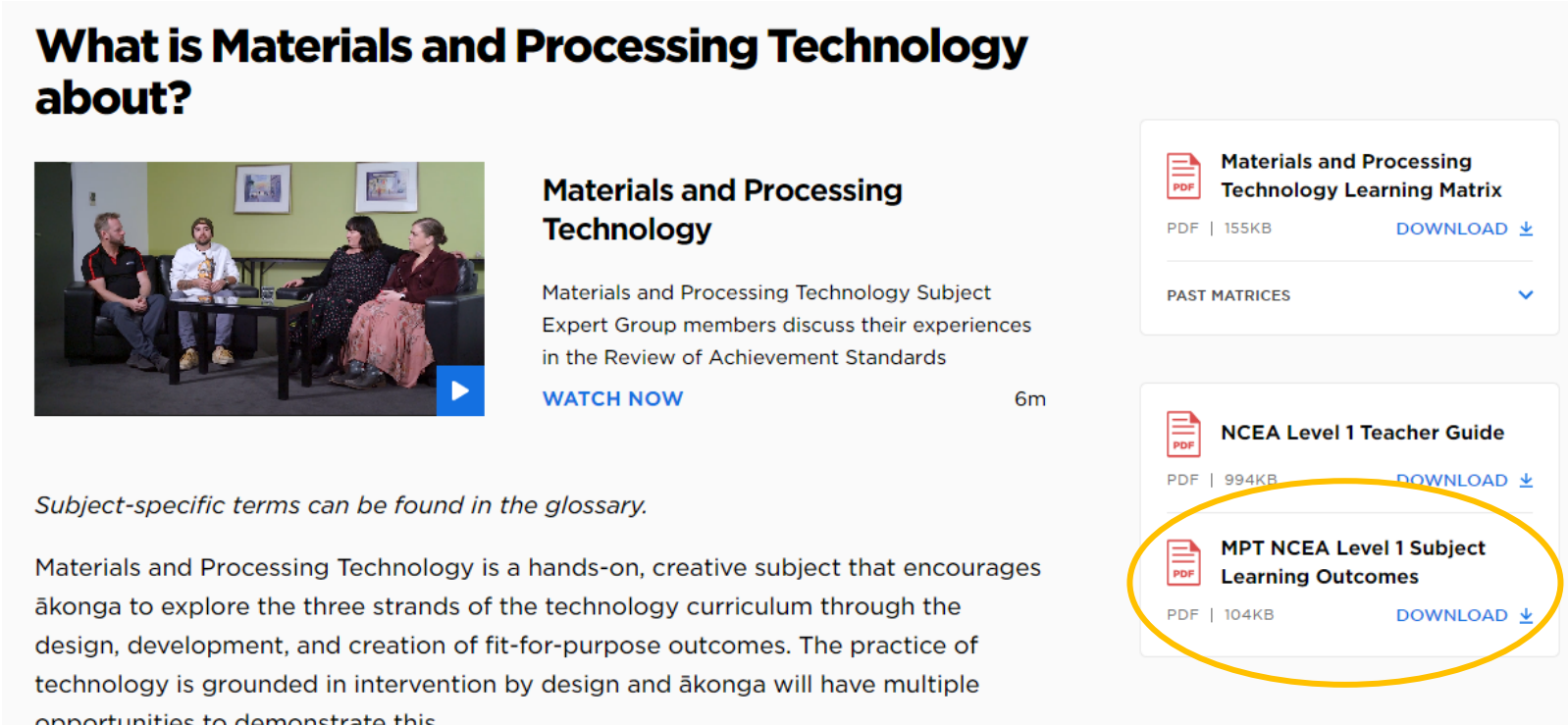
Materials and Processing Technology | NCEA (education.govt.nz)

Where can I find them?

- Subject Learning Outcomes are located where you already access the Learning Matrix for your subject – the Learning tab on the NCEA.education website



Materials and Processing Technology SLOs



What are Subject Learning Outcomes?

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- Subject Learning Outcomes help to identify the learning that underpins the knowledge and skills that students need to be ready for assessment.
  - Students will draw on this learning during assessment.

- Subject Learning Outcomes are used:
  - to check what you have included in your teaching and learning programmes
  - to check for student capabilities in the lead up to assessment

- ***Note:***
  - *Each learning outcome included does not necessarily need the same amount of teaching time.*
  - *Subject Learning Outcomes will look different across subjects due to the nature of the subject*

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Achievement Standard 1.1 (92012): Develop a Materials and Processing Technology outcome in an authentic context (6 Credits)

Achievement Standard 1.1 (92012): Develop a Materials and Processing Technology outcome in an authentic context (6 Credits) **previous version**

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What is being assessed	Subject Learning Outcomes
Use of Technological Practice	Students are able to: • use technological practice to develop and create a physical Materials and Processing Technology outcome for a person, whānau or community within an authentic context. Students will develop a brief with specifications (including physical and functional) or use a given brief with specifications to outline the 'W's and H' — the who, what, when, where, why, and how, of the development process and outcome. For higher levels of achievement, students are able to: • seek, record, and apply stakeholder feedback to guide the development and creation of the outcome • refine the given brief with specifications to guide the development and creation of the outcome.
Evaluation of Technological Practice	Students are able to: • assess the outcome against the brief with specifications to show how the outcome is fit for purpose. For higher levels of achievement, students are able to: • evaluate the outcome for the end user or user against the brief with specifications, either in the situation it has been created for or in a modelled situation • explain decisions that improve the outcome's fitness for purpose and its ability to meet the requirements of the brief with specifications.

Achievement Standard 1.1 (92012): Develop a Materials and Processing Technology outcome in an authentic context (6 Credits) current version

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What is being assessed	Subject Learning Outcomes
Apply technological practice in an authentic context to develop and create a Materials and/or Processing Technology outcome	Students are able to: • apply technological practice in an authentic context to a materials and/or processing technology outcome, including but not limited to resistant materials, textiles, food, digital, or electronics. For example, they will understand and apply the iterative stages of technological practice by: ○ identifying a need and/or opportunity for a person, whānau, or community ○ undertaking relevant research ○ ideating, developing, and refining ideas ○ evaluating ideas and outcomes. For example, evaluate the outcome against the brief with specifications to determine fitness for purpose, ie has the outcome met the brief with specifications, if so how? If not, why? • use or develop a given brief which outlines: ○ the who, what, when, where, how, and why (conceptual statement) ○ measurable physical and functional specifications to enable evaluation of fitness for purpose in the actual or modelled intended environment. Students can generate their own brief with specifications and/or refine a given brief with specifications. • develop and create a fit-for-purpose outcome. For example, use practical skills to safely develop and create an outcome that is guided by the brief with measurable specifications and meets the requirements of the end user. For Merit, students are able to: • seek, record, analyse, and apply stakeholder feedback. For example, respond to the stakeholder feedback received from more than one stakeholder at more than one stage and use it to guide the development of the outcome. • explain decisions that inform improvements by showing how the quality of the outcome was enhanced. For example, through the results of testing undertaken during development.

Achievement Standard 1.1 (92012): Develop a Materials and Processing Technology outcome in an authentic context (6 Credits) **current version**

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	For Excellence, students are able to:
	• analyse how stakeholder feedback informed development. For example, closely examine and respond to advice or comments received from stakeholders by implementing changes to the developing outcome.
	• evaluate the outcome against the brief with specifications to determine fitness for purpose, considering stakeholder(s), end user(s), and potential next steps. For example:
	  ○ evaluate the finished outcome in the intended or modelled environment to determine its effectiveness and fitness for purpose for the stakeholder(s)
	  ○ evaluate outcome for the end user against the brief with the measurable physical and functional specifications, to determine its fitness for purpose
	  ○ explain decisions that inform potential improvement for the final outcome to improve the fitness for purpose (what went well and how/why can it be improved?).

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Achievement Standard 1.2 (92013): Experiment with different materials to develop a Materials and Processing Technology outcome (6 Credits)

Achievement Standard 1.2 (92013): Experiment with different materials to develop a Materials and Processing Technology outcome (6 Credits) previous version

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What is being assessed	Subject Learning Outcomes

Experimenting to explore materials	Students are able to:
	• investigate a variety of materials by exploring their properties for the purpose of discovery
	• develop and create a purposeful outcome to meet a need or opportunity for a person, whānau, or community. This involves:
	  ○ exploring materials through experimentation. They could try transforming, or combining, or manipulating, or forming, or a combination of all four.
	  ○ demonstrating what they know about the properties of different materials, for example exploring the feasibility of transforming, or combining, or manipulating, or forming materials, or a combination of all four, and understand what they might be best used for.
	
	For higher levels of achievement, students are able to:
	• extend their understanding by carrying out ongoing investigation and analysis, incorporating iterative 'what if' questions
	• incorporate stakeholder feedback to guide the development of the purposeful outcome
	• use ongoing analysis to refine and justify the use of the chosen materials
	• explain decisions and reasons for choice about the selected material or materials and their properties as they develop and create a purposeful outcome.

Achievement Standard 1.2 (92013): Experiment with different materials to develop a Materials and Processing Technology outcome (6 Credits) current version

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What is being assessed	Subject Learning Outcomes

Develop and create a purposeful Materials and/or Processing Technology outcome through experimentation with different materials	Students are able to:
	• safely explore materials through experimentation. They could try:
	  ○ transforming, and/or
	  ○ combining, and/or
	  ○ manipulating, and/or
	  ○ forming, and/or
	  ○ a combination of all four.
	• select different materials (including but not limited to items, ingredients, and/or components that an outcome can be made from) to use in initial material explorations
	• identify how the exploration/experiments informed their understanding of the properties of materials. For example, what was discovered about material properties as a result of:
	  ○ transforming, and/or

Achievement Standard 1.2 (92013): Experiment with different materials to develop a Materials and Processing Technology outcome (6 Credits) current version

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	○ combining, and/or ○ manipulating, and/or ○ forming, and/or ○ a combination of all four techniques and processes. • identify a need or opportunity for a person, whānau, or community. A purposeful context may arise as a result of the process of materials experimentation and/or it may be identified as part of a given brief. • apply the knowledge gained from material explorations to guide the deliberate selection of materials to use for the creation of a purposeful outcome • use practical skills to develop and create a purposeful outcome using the selected materials. For Merit, students are able to: • carry out ongoing investigation of the properties of materials. For example, undertaking further experiments to gather deeper understanding of how materials function and their physical attributes. A series of 'what if' questions could guide decision-making, for example 'what would happen if epoxy resin was inlaid in timber?'. • apply knowledge gained from further investigation of material properties and select the most suitable materials, for example, make comparisons between the methods of transforming, and/or combining, and/or manipulating, and/or forming materials to make an informed decision • examine, analyse, and implement stakeholder feedback gathered from more than one person at different stages during experimentation with materials • communicate how relevant stakeholder feedback guided the selection of materials and informed the development and creation of the purposeful outcome. For Excellence, students are able to: • examine in detail the properties of the materials explored and use the findings to guide a deliberate selection of suitable material/s, for example, compare the benefits and

Achievement Standard 1.2 (92013): Experiment with different materials to develop a Materials and Processing Technology outcome (6 Credits) **current version**

	constraints of the materials in relation to development and creation of the purposeful outcome • show sound reasoning and justification for the selection of materials used in the development and creation of the purposeful outcome.

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Achievement Standard 1.3 (92014): Demonstrate understanding of sustainable practices in the development of a Materials and Processing Technology design (4 Credits)

Achievement Standard 1.3 (92014): Demonstrate understanding of sustainable practices in the development of a Materials and Processing Technology design (4 Credits) previous version

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What is being assessed	Subject Learning Outcomes

Sustainable practice in the development of a Materials and Processing Technology outcome	Students are able to:
	• develop a Materials and Processing Technology design. This involves investigating and applying sustainable practices. They will also apply stakeholder feedback to inform decision making and guide the application of sustainable practices during the development of the design.
	• discuss kaitiakitanga in the context of applying sustainable practices for the environment during the development of their design. Examples of ways students can fulfil their responsibility towards the environment include:
	  ○ the selection of materials
	  ○ the economic use of materials
	  ○ the appropriate disposal of waste materials.
	• use a design process for a person, whānau, or community that may include:
	  ○ ongoing research
	  ○ developing initial concept designs
	  ○ refining and developing the design.
	
	For higher levels of achievement, students are able to:
	• seek, record, and apply stakeholder feedback to refine design development
	• reflect on how stakeholder feedback informs design development
	• explain and evaluate decisions and reasons for choice about the sustainable practices applied to the design.

Achievement Standard 1.3 (92014): Demonstrate understanding of sustainable practices in the development of a Materials and Processing Technology design (4 Credits) current version

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What is being assessed	Subject Learning Outcomes
Apply sustainable practices in the development of a Materials and Processing Technology design for an outcome Show knowledge of sustainable practices used in the design and development of a Materials and Processing Technology outcome	This Achievement Standard does not require the design to be developed into a physical outcome. Students are able to: • develop Materials and Processing Technology concept designs. This involves investigating and applying sustainable practices for the environment, to the design process. For example, the inks or stains used in the creation of a technology outcome, and consideration of resulting waste. • use technology practice to underpin their design process • apply stakeholder feedback to inform decision-making and guide the application of sustainable practices during the development of the design • discuss kaitiakitanga in the context of applying sustainable practices for the environment during the development of their design. Examples of ways students can fulfil their responsibility towards the environment include:

Achievement Standard 1.3 (92014): Demonstrate understanding of sustainable practices in the development of a Materials and Processing Technology design (4 Credits) current version

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	○ the selection of materials, for example, ingredients, components, and other resources ○ the economic use of materials, for example, using a lay plan, repurposing materials, or preserving or dehydrating excess food ○ the appropriate disposal of waste materials, for example, considering recycling or use of e-waste facilities for excess circuitry. • use a design process for a person, whānau, or community that may include: ○ ongoing research ○ developing initial concept designs ○ refining and developing the design through ongoing research, developing initial concept designs, and refining initial concept designs during the creation of the design. For Merit, students are able to: • seek, document, analyse, and apply stakeholder feedback to refine design development. For Excellence, students are able to: • evaluate how stakeholder feedback informs design development in relation to the application of sustainable practices • evaluate how the feedback received from stakeholders informed decisions about the sustainable practices applied to the design.

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Achievement Standard 1.4 (92015): Demonstrate understanding of techniques selected for a feasible Materials and Processing Technology outcome (4 Credits)

Achievement Standard 1.3 (92014): Demonstrate understanding of sustainable practices in the development of a Materials and Processing Technology design (4 Credits) previous version

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What is being assessed	Subject Learning Outcomes
Trial, describe and select appropriate techniques	Students are able to: • investigate and trial relevant techniques during the development of a feasible outcome. This involves describing and then selecting the most appropriate techniques for the feasible outcome. For higher levels of achievement, students are able to: • compare the most appropriate techniques to inform decision making in the refinement of the feasible outcome • seek, record, and apply stakeholder feedback in decision making for the feasible outcome • analyse trialling techniques and stakeholder feedback and explain how these combine to inform and improve the feasibility of the outcome • use technological practice to develop and create a physical Materials and Processing Technology outcome for a person, whānau or community within an authentic context. Students will develop a brief with specifications (including physical and functional) or use a given brief with specifications to outline the 'W's and H' — the who, what, when, where, why, and how, of the development process and outcome.

Achievement Standard 1.4 (92015): Demonstrate understanding of techniques selected for a feasible Materials and Processing Technology outcome (4 Credits) current version

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What is being assessed	Subject Learning Outcomes
Describe, trial, and select appropriate techniques for a feasible Materials and/or Processing Technology outcome	This Achievement Standard does not require a final physical outcome to be made. Students need an understanding of functional modelling. This may involve trialling part of the designed outcome to determine potential fitness for purpose. Students are able to: • identify a potential materials and/or processing technological outcome • investigate and trial appropriate techniques during the development of a feasible outcome, with the focus being on what is relevant. A feasible outcome is one that is capable of being created. This involves describing, trialling, and then selecting the most appropriate techniques for the feasible outcome. For example: ○ consider the functional attributes of the technological outcome when selecting techniques to trial, ie seams, joints, meat tenderisation. For Merit, students are able to: • compare the most appropriate techniques to inform decision-making in the refinement of the feasible outcome • seek, document, analyse, and apply stakeholder feedback in decision-making for selecting techniques for a feasible outcome. For Excellence, students are able to: • analyse how trialling, appropriate techniques, and stakeholder feedback connect to inform and improve the feasibility of the outcome.

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Lifting the context for authenticity

To support rangatiratanga in Technology

Stephanie O’Sullivan

Te Tāhuhu o te Mātauranga
Ministry of Education

Authentic Contexts

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An authentic context refers to a real-life situation within which an outcome can be developed. The situation or use of the outcome may be familiar to students.

- Authentic Contexts — Online Engagement and Teaching Hub (westernsydney.edu.au)
- Authentic learning: What is it, and why is it important? (turnitin.com)
- What is authentic curriculum? (growwaitaha.co.nz)
- Authentic Context: Make it Local — YouTube
- Authentic Context: Community Partners — YouTube
- Student Projects: Defining the Target Group — YouTube

Develop a Materials and Processing Technology outcome in an authentic context | NCEA (education.govt.nz)

Rangatiratanga

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Lifting the context encourages self-empowerment and self-determination for ākonga in the classroom, and in turn for their whānau and their community.

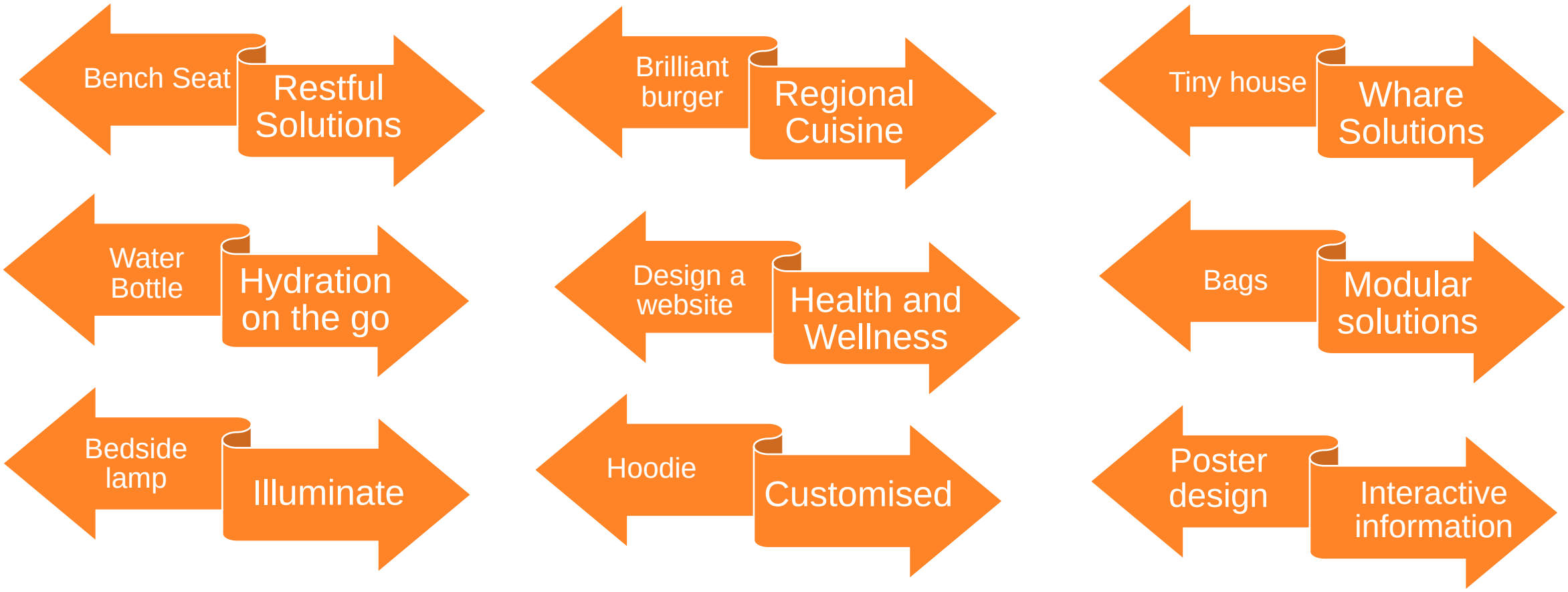
Ākonga are engaged when they understand what, how, and why they are learning.

Ākonga that have rangatiratanga demonstrate self-determination, problem-solving skills, perseverance and courage.

Māui, the hero of Polynesian culture, demonstrated rangatiratanga. Māui had the strength and courage to ‘think outside the box’ to solve problems, a true technologist.

- Insights into kaupapa Māori: Rangatiratanga — YouTube
- Holding on to your rangatiratanga | Watene Campbell | TEDxYouth@TeAro — YouTube
- Honouring Te Tiriti and promoting culturally empowering practices in schools – The Education Hub
- The Dowse education — Tino Rangatiratanga — YouTube
- First peoples in Māori tradition — Te Ara Encyclopedia of New Zealand
- Māui — Te Ara Encyclopedia of New Zealand

Lifting the context



Instead of the context being based on a predetermined outcome, try lifting the context, to enable ākonga to determine the outcome themselves, within an authentic context.

Further examples could include:

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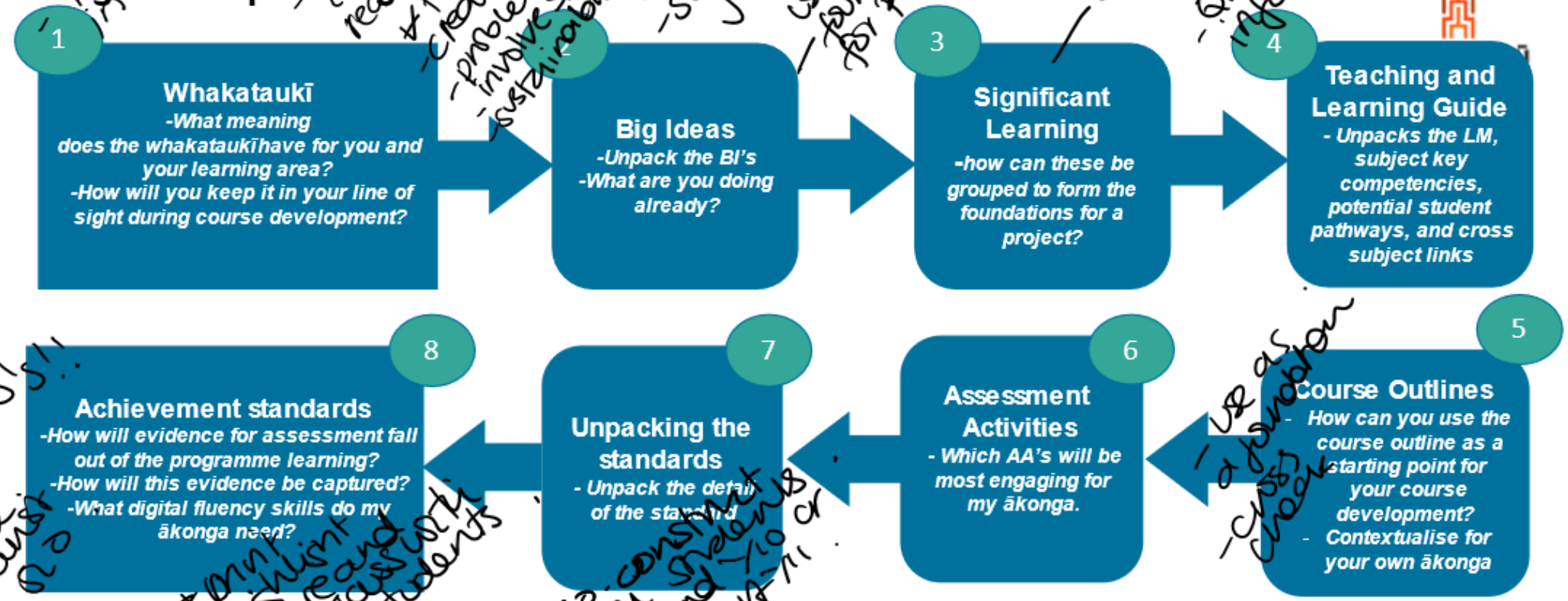
Body adornment	Garden to table	Health and Wellness
Regional cuisine	New beginnings	Compact living
Hydration on the move	Augmented reality tour/ guide/ exhibit/ sign	Indigenous plant-based products
Smart home solutions	Food waste reduction	Design thinking for social change
We eat with our eyes	Inclusive design solutions	Assistive solutions
Modular solutions	Interactive information design	Sustainable living
NZ endangered species awareness	Multi-purpose solutions	Designing for good
Customised	Street Style	Ka mua ka muri
Renewal	VR guide/tour (local, gallery, museum)	Biophilic design
Biomimetics	Illuminate	Portable food

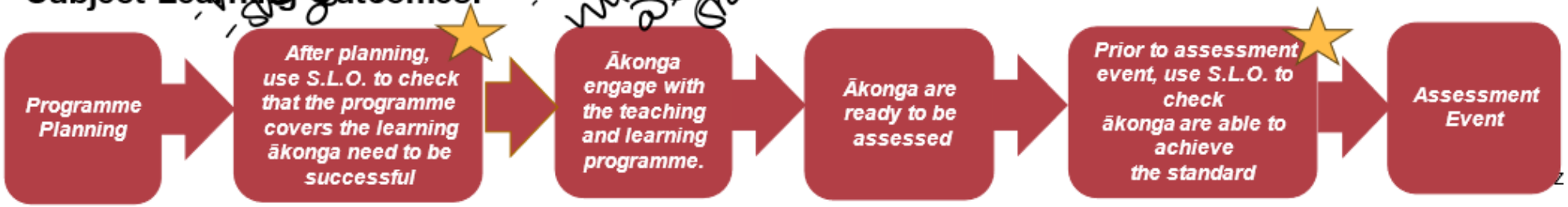
Using the SLO – how could I use the revised SLOs?

Material and Processing Technology

Programme planning:



Subject Learning Outcomes:



real situations

Kaua e rangiruatia te hāpai o te hoe; e kore tō tātou waka e ū ki uta.

Do not lift the paddle out of unison; our canoe will never reach the shore.

The Technology Learning Area whakataukī offers a framework for understanding technology practice.

It tells the story of a waka and the journey shared by those on board as they travel towards new shores.

Big Ideas			
Authentic contexts encourage fit-for-purpose Materials and Processing Technology outcomes	**Creative problem solving in Materials and Processing Technology develops innovation and resilience**	**Design empathy leads to Materials and Processing Technology outcomes that enhance people's lives**	**Sustainability underpins intervention by design in Materials and Processing Technology practice**

brief with specifications - technological literacy

not the first ideal; iteration in design process

stakeholders endusers thinking about others

has been covered prior - but tends to be optional. ⇒ Sustainability should underpin some design work

Reflect on current practice | **Ka mua, ka muri** | walking backwards into the future:

Continue doing this	Start doing this	Stop doing this	More of this	Less of this

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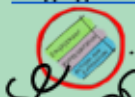
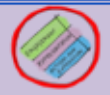
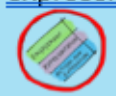
Reflect on current practice | **Ka mua, ka muri** | walking backwards into the future:

Continue doing this….	Start doing this….	Stop doing this….	More of this….	Less of this…
- supporting ākonga to identify authentic contexts. - continue evaluating against brief with spec's in situ. - build on attributes	- emphasising the importance of sustainability @ the design stage.	- selecting contexts that only have one outcome e.g. hoodies. - give students more choice	- co-constructing contexts with ākonga. - looking to the community for authentic contexts - social context - cpchow/ sustainability	- paperwork for paperworks sake -

Apply UDL Principles to Programme Planning

Who are the people and what do we know?	• What's on top for ākonga that could have an impact on learning and wellbeing? • What do we know about prior learning? • What community connections and relationships do we have? • Cultures, languages and identities • Ākonga strengths • Prior knowledge and experience • Specific needs and preferences	- Year 10 projects knowledge and skills - could recap?? - who are ākonga - taught before - shorter activity - identity - slow start?? - look at learning area end of year statements
What is the purpose and goal?	• What is the purpose and goal of the course? • How will we share the purpose and goal of the activity? • Can we create an opportunity where the goal/purpose is designed with ākonga? engagement	- purpose essential for student engagement - must be meaningful. - Start of year. Build context, knowledge together!
What barriers (in the way **we** do things) could get in the way for people?	What in our design or the way we teach and communicate could create inequity and discrimination or get in the way of learning? • What could get in the way of the engagement and motivation of ākonga or create anxiety? • What could create confusion or get in the way of people connecting to new ideas? • What could stop ākonga fully participating, collaborating, and sharing their thinking? • What hasn't worked so well in the past?	- offer options for project work - Google Classroom - word copies - other. - how do they want to collate submissions/evidence for assessment. - what have they done in Y9/Y10 - how was this collation scaffolded? - what will they need to be taught??
What can we build into the activity and offer to everyone?	• What kinds of approaches, resources, tools, experiences would ākonga find valuable? • What options could we include that ākonga have found helpful in the past?	- learning cards - don't assume! - books - videos - Youtube/homemade - resource 'noticeboard' - share ideas themes? a new activity/or expanded activity from Y10.
	With the above design process in mind, how can you	

Refine plan to increase support for engagement 	What options and design decisions could we include to: • connect with the culture, language, identity, ability, strengths and interests of ākonga? • Ensure the design is actively inclusive of diverse perspectives and experiences and free from discrimination • Give equal status to Mātauranga Māori • Offer choice and support autonomy • Foster collaboration and community • Make connections to the world beyond school • Sustain motivation?	
Refine plan to increase support for access & understanding 	What options could we use to: • support communication of key concepts and new or important key concepts, including: appropriate **tools and techniques to** use to create outcomes. • **conventions that** are relevant to the outcomes. • Ensure the materials or resources we offer are available in multiple media • Support understanding across our different cultures and languages	
Refine plan to increase support for participation and expression 	What options can we include to: • Access activities materials, tools and learning environments • Demonstrate understanding in multiple ways, what does this look like? • Build their goal setting, planning and self – management skills? • **Test and improve** outcomes with others • What will success look like?	

Project A – Highlight the significant Learning to be covered in this project	Project B - Highlight the significant Learning to be covered in this project
Authentic Context: Customised	**Authentic Context:** Ka Mua Ka Muri
At Curriculum Level 6, ākonga will……	**At Curriculum Level 6, ākonga will……**
• understand how mātāpono Māori, tukanga, manaakitanga, kaitiakitanga, rangatiratanga, whanaungatanga, kotahitanga, wairuatanga, and auahatanga can be interlinked and woven together during the development and creation of Materials and Processing Technology outcomes • understand how the Pacific values of alofa, vā, fonua, vaka, and kuleana are interlinked and woven together during the development and creation of Materials and Processing Technology outcomes • take into consideration the cultural safety of themselves and others during the development and creation of Materials and Processing Technology outcomes • understand the importance of the physical safety of themselves and others when using materials, tools, and equipment during the development and creation of Materials and Processing Technology outcomes for end users • understand the importance of whanaungatanga through wānanga and talanoa to develop outcomes centred around the needs of a person, whānau, or community during the development and creation of Materials and Processing Technology outcomes • understand the influence of worldviews and society during the development and creation of Materials and Processing Technology outcomes • understand the influence of Materials and Processing Technology outcomes on society • understand how 'Ka mua, ka muri' influences reflective practice during the development and creation of Materials and Processing Technology outcomes • explore the properties of materials during the development and creation of Materials and Processing Technology outcomes • explore techniques to determine appropriate functional attributes during the development and creation of Materials and Processing Technology outcomes • use planning, testing, and stakeholder feedback to inform decision-making during the development and creation of Materials and Processing Technology outcomes • use technological practice to solve real-world problems and realise opportunities during the development and creation of Materials and Processing Technology outcomes • manipulate, transform, combine, and form materials during the development and creation of Materials and Processing Technology outcomes • apply sustainable practices during the development and creation of Materials and Processing Technology outcomes.	• understand how mātāpono Māori, tukanga, manaakitanga, kaitiakitanga, rangatiratanga, whanaungatanga, kotahitanga, wairuatanga, and auahatanga can be interlinked and woven together during the development and creation of Materials and Processing Technology outcomes • understand how the Pacific values of alofa, vā, fonua, vaka, and kuleana are interlinked and woven together during the development and creation of Materials and Processing Technology outcomes • take into consideration the cultural safety of themselves and others during the development and creation of Materials and Processing Technology outcomes • understand the importance of the physical safety of themselves and others when using materials, tools, and equipment during the development and creation of Materials and Processing Technology outcomes for end users • understand the importance of whanaungatanga through wānanga and talanoa to develop outcomes centred around the needs of a person, whānau, or community during the development and creation of Materials and Processing Technology outcomes • understand the influence of worldviews and society during the development and creation of Materials and Processing Technology outcomes • understand the influence of Materials and Processing Technology outcomes on society • understand how 'Ka mua, ka muri' influences reflective practice during the development and creation of Materials and Processing Technology outcomes • explore the properties of materials during the development and creation of Materials and Processing Technology outcomes • explore techniques to determine appropriate functional attributes during the development and creation of Materials and Processing Technology outcomes • use planning, testing, and stakeholder feedback to inform decision-making during the development and creation of Materials and Processing Technology outcomes • use technological practice to solve real-world problems and realise opportunities during the development and creation of Materials and Processing Technology outcomes • manipulate, transform, combine, and form materials during the development and creation of Materials and Processing Technology outcomes • apply sustainable practices during the development and creation of Materials and Processing Technology outcomes.

embellishment - link to transform, manipulate, combine form (1.2)
structural - link to trial techniques 1.4)

Project A: Refer to highlighted Significant Learning

What will students be doing?	What evidence will students produce?	What resources are needed?
making a thing for a specific purpose to solve an authentic problem. Could use a pattern - but would need to customise?? - how? - structural * - embellishment	- outcome - digital or hard copy of project. - Collated evidence for a submission - separate doc - look @ spec's.	- materials for trialling to learn about properties - students might purchase own materials - encourage sustainability. - tools and equipment to practice techniques

pre-learning about customisation - what it is what it means, look at existing outcomes/designers etc.

What aspects of Mātauranga Māori can be surfaced in Project A?	What aspects of the Pacific Values Framework can be surfaced in Project A?	What aspects of future pathways can be surfaced in project A?
whakatauaka - innovation and creativity through customisation. - manaakitanga - talk about customising for someone else - showing care by developing and creating and outcome to meet another's specific needs - tikanga - understanding and applying codes of practice. Taking care if breaking these to customise - tikanga?	alofa - if making for another. vaka - a journey of discovery as they model and improve the customisation of the outcome they are developing. vā - relationships - in the class and with stakeholders.	- investigate technologists who create customised outcomes. - share my interest of upgrading through customisation - local technologists - chat to students? - recognise soft skills trip?!

- **How could student evidence fall out of the year of learning?**
- **How could it drop into the important aspect of Level 1 learning (enduring competency) assessed by each Achievement Standard?**
- **How could the evidence be captured?**

1.1 Develop a Materials and Processing Technology outcome in an authentic context	1.2 Experiment with different materials to develop a Materials and Processing Technology outcome	1.3 Demonstrate understanding of sustainable practices in the development of a Materials and Processing Technology Outcome	1.4 Demonstrate understanding of techniques selected for a feasible Materials and Processing Technology outcome
- authentic context - brief - attributes, specifications - evaluation - fitness for purpose - situated - impact on design - end user	- outcome - authentic/ purposeful - explanation of materials - properties - how can these properties be used in a customised outcome - structural/decorative - refined - evaluated		- what need to investigate techniques - best match for customised outcome

Subject Learning Outcome check list: Customise

Achievement Standard 1.1 (92012): Develop a Materials and Processing Technology outcome in an authentic context (6 Credits)				
What is being assessed? Apply technological practice in an authentic context to develop and create a Materials and/or Processing Technology outcome				
To Achieve Students are able to…	Yes	No	How will I scaffold teaching and learning of this concept?	Student questions (slide deck for curating evidence from course work)
Does the programme of learning apply technological practice in an authentic context to an MPT outcome?	✓		Support students to identify an authentic project within the context. Consider stakeholders - when could they input to influence decision making?	Have I applied technological practice in an authentic context?
• Will ākonga have the opportunity to identify a need or opportunity for a person, whānau or community?	✓		may need to teach recording resources, think about bias, be selective, give reasons for choice	Have I identified a need or opportunity for a person whānau or community?
• Will ākonga have the opportunity to undertake relevant research?	✓			Have I carried out research for my project?
• Will ākonga have the opportunity to ideate, develop, and refine ideas?	✓		will need to design, make full and partial models - PMI ideas - stakeholder feedback	Have I created initial concepts, and then developed and refined design ideas in the development of the outcome?
• Will ākonga have the opportunity to evaluate ideas and outcomes? i.e evaluate the outcome against the brief with specifications to determine fitness for purpose?	✓		Develop brief with specifications evaluate for fitness for purpose. → use to inform table? - put evaluation next to spec's?	Have I evaluated the design ideas against the brief with specifications to determine fitness for purpose? Have I evaluated the outcome against the brief with specifications to determine fitness for purpose?
Does the programme of learning enable students to use or develop a given brief? (*Noting students can generate their own brief with specifications and/or refine a given brief with specifications*)	✓		provide context - have a brief that could be customised - use questions to scaffold production of brief with spec's - did they do year 10??	Have I developed my own, or refined a teacher given brief with specifications?
• Will ākonga have the opportunity to outline who, what, when, where, why, and how in their brief?	✓		- use Q's to support.	Does my brief include who, what, where, when, why and how?
• Will ākonga have the opportunity to state measurable physical and functional specifications to enable the evaluation of fitness for purpose in the actual or modelled intended environment?	✓		- use research, modelling etc. to turn into it must / it must not statements.	Have I developed a set of specific and measurable physical and functional specifications? Will these specifications enable me to determine fitness for purpose in the modelled or intended environment (situation for design?)
Does the programme of learning enable ākonga to develop and create a fit-for-purpose outcome that meets the requirements of the end user?	✓		plan together how to break up the time - develop personal goals - set timeline benchmarks self/stakeholder	Have I created a fit for purpose outcome that meets the requirements of the end user?

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For Merit, students are able to…				
Does the programme of learning enable ākonga to seek, record, analyse and apply stakeholder feedback?	✓		- how to ask questions - how to record - audio, written, post its. - when should stakeholder/end user be consulted?	Have I recorded, analysed, and applied stakeholder feedback during the development of the outcome?
• E.g Will ākonga have the opportunity to respond to feedback received from more than one stakeholder at more than one stage and use it to guide the development of the outcome?	✓		- what makes a good stakeholder? - what makes a good response? stakeholder ⇒ who? ⇒ response ⇒ learned ? when? why? ↳ how will this	Have I sought feedback from more than one stakeholder at more than one point during development? too much for M. inform practice ? decisions
Does the programme of learning enable ākonga to explain decisions that inform improvement by showing how the quality of the outcome was enhanced?			↳ decisions → improvement - enhanced or not - because - explain	~~What decisions have I made that have informed~~ the improved quality of the outcome I have developed and created?
• E.g. Will ākonga have the opportunity to use testing results to inform decision making?			research + research + research = decision - person, test, trial, model etc. ↓ impacts design	How has testing/functional modelling informed decisions that I have made whist developing and creating the outcome?

For Excellence, students are able to…				
Does the programme of learning enable ākonga to analyse how stakeholder feedback informed development?			Check exemplar for depth on Hand E.	Have I analysed how stakeholder feedback has informed the development and creation of the outcome?
• E.g. will ākonga have the opportunity to closely examine and respond to advice or comments received from stakeholders by implementing changes to the developing outcome?	✓		How can this be compiled succinctly? - use a table - what questions would promote the depth required for E?	Have I examined and responded to stakeholder advice during the development of the outcome?
Does the programme of learning enable ākonga to evaluate the outcome against the brief with specification to determine fitness for purpose by considering stakeholder(s), end user(s) and potential next steps?	✓		- venn diagram - arrows - table - like the old key factors. - need to show connections - one page.	Have I evaluated the outcome against the brief with specifications to determine fitness for purpose by considering the requirements of stakeholder(s) and end user(s).
• E.g Will ākonga have the opportunity to evaluate the finished outcome in the intended or modelled environment to determine its effectiveness and fitness for purpose for the stakeholder(s)	✓		- if teaj practice followed sitration would be considered throughout practice - therefore situating outcome should be possible. several images -	Have I evaluated the outcome in the modelled or intended environment to determine its effectiveness and fitness for purpose for the stakeholders? stakeholder/end user comments of use in situ.
• E.g. Will ākonga have the opportunity to evaluate the outcome for the end user against the brief with the measurable physical and functional specifications, to determine its fitness for purpose	✓		take each part eg brief and spec's in turn - peer to peer interview and record?	Have I evaluated the finished outcome against the physical and functional specifications to determine fitness for purpose
• E.g. Will ākonga have the opportunity to explain decisions that inform potential improvement for the final outcome to improve the fitness for purpose (what went well and how/why can it be improved?).	✓		Improvements - sketch - written - audio } best way to indicate for customised design?	Have I explained decisions that inform potential refinements of the outcome to improve fitness for purpose, if I was to make the outcome again?

Achievement Standard 1.2 (92013): Experiment with different materials to develop a Materials and Processing Technology outcome (6 Credits)				
What is being assessed? **Develop and create a purposeful Materials and/or Processing Technology outcome through experimentation with different materials**				
To Achieve Students are able to…	**Yes**	**No**	**How will I scaffold teaching and learning of this concept?**	**Student prompt questions (slide deck for curating evidence from course work)**
Does the programme of learning enable ākonga to safely explore materials through experimentation?				Have I safely explored materials through experimentation?
• Will ākonga have the opportunity to ○ transform, and/or ○ combine, and/or ○ manipulate, and/or ○ form and/or ○ a combination of all four?				Have I explored materials through transforming and/or combining and/or manipulating and/or forming and/or a combination of all of these?
Does the programme of learning enable ākonga to experiment with different materials *(including but not limited to items, ingredients, and/or components that an outcome can be made from*) during the initial material explorations?				Have I experimented with different materials during my initial materials experimentation/exploration?
Does the programme of learning enable ākonga to identify how the exploration/experiments informed their understanding of the properties of materials				Have I identified how the experimentation/exploration has informed my understanding of the properties of materials?
• E.g Will ākonga have the opportunity to discover and experientially learn about material properties, for example as a result of: ○ transforming, and/or ○ combining, and/or ○ manipulating, and/or ○ forming, and/or ○ a combination of all four				Have I recorded examples of what I have learned when I experimented/explored different materials in a variety of ways?

Does the programme of learning enable ākonga to identify a need or opportunity for a person, whānau, or community? *Note: A purposeful context may arise as a result of the process of materials experimentation and/or it may be identified as part of a given brief.*				Have I identified a need or opportunity for a purposeful outcome for a person whānau or community?
Does the programme of learning enable ākonga to apply the knowledge gained from material explorations to guide the deliberate selection of materials to use for the creation of a purposeful outcome?				Have I used the knowledge I have gained about materials properties through experimentation/ exploration to make informed decisions about what materials to use in the development and creation of a purposeful outcome?
Does the programme of learning enable ākonga to use practical skills to develop and create a purposeful outcome using the selected materials?				Have I sued practical skills to develop and crate a purposeful outcome using selected materials?

For Merit, students are able to…				
Does the programme of learning enable ākonga to carry out ongoing investigation of the properties of materials?				Have I carried out ongoing investigation of the properties of materials?
• E.g will ākonga have the opportunity to undertake further experiments/exploration to gather deeper understanding of how materials function and their physical attributes?				Have I carried out further experiments/exploration, to seek deeper understanding about how materials function and their physical attributes?
• E.g will ākonga have the opportunity to ask a series of 'what if' questions that could guide decision-making?				Have I asked a series of what if questions? Have the what if questions informed my decision making? How?
Does the programme of learning enable ākonga to apply knowledge gained from further investigation of material properties and select the most suitable materials?				Have I applied knowledge from my ongoing investigation of materials properties to select the most suitable materials?
• E.g will ākonga have the opportunity to make comparisons between the methods of transforming, and/or combining, and/or manipulating, and/or forming materials to make an informed decision?				Have I made comparisons between transforming, combining, manipulating or forming or a combination of these to make informed decisions?
Does the programme of learning enable ākonga to examine, analyse, and implement stakeholder feedback gathered from more than one person at different stages during experimentation with materials				Have I analysed, examined, and implemented stakeholder feedback? Have I consulted with more than one stakeholder at more than one point in the project?
Does the programme of learning enable ākonga to communicate how relevant stakeholder feedback guided the selection of materials and informed the development and creation of the purposeful outcome				Have I recorded how relevant stakeholder feedback informed the selection of materials and the development and creation of the outcome?

For Excellence, students are able to…				
Does the programme of learning enable ākonga to examine in detail the properties of the materials explored, and then use these findings to guide the deliberate selection of suitable material/s?				Have I examined the properties of the explored materials and used these findings to make informed decisions to select the most suitable materials in the development and creation oof the purposeful outcome?
• E.g compare the benefits and constraints of the materials in relation to development and creation of the purposeful outcome?				Have I compared the benefits and constraints of the materials and applied this knowledge to the development and creation of the purposeful outcome?
Does the programme of learning enable ākonga to show sound reasoning and justification for the selection of materials used in the development and creation of the purposeful outcome?				Have I justified the selection of materials used in the development and creation of the purposeful outcome?

Achievement Standard 1.3 (92014): Demonstrate understanding of sustainable practices in the development of a Materials and Processing Technology design (4 Credits)				
What is being assessed? **Apply sustainable practices in the development of a Materials and Processing Technology design for an outcome** **Show knowledge of sustainable practices used in the design and development of a Materials and Processing Technology outcome**				
To Achieve Students are able to…	**Yes**	**No**	**How will I scaffold teaching and learning of this concept?**	**Student questions (slide deck for curating evidence from course work)**
Does the programme of learning enable ākonga to develop Materials and Processing Technology concept designs. This involves investigating and applying sustainable practices for the environment, to the design process?				Have I developed concept designs? Have I developed concept designs by investigating and applying sustainable practices to the design?
Does the programme of learning enable ākonga to use technological practice to underpin the design process?				Have I applied technological practice to underpin the design process? What aspects of Technological practice have I applied to the design process?
Does the programme of learning enable ākonga to apply stakeholder feedback to inform decision-making and guide the application of sustainable practices during the development of the design?				Have I applied stakeholder feedback to inform-decision making and guide the application of sustainable practices during the development of the design?

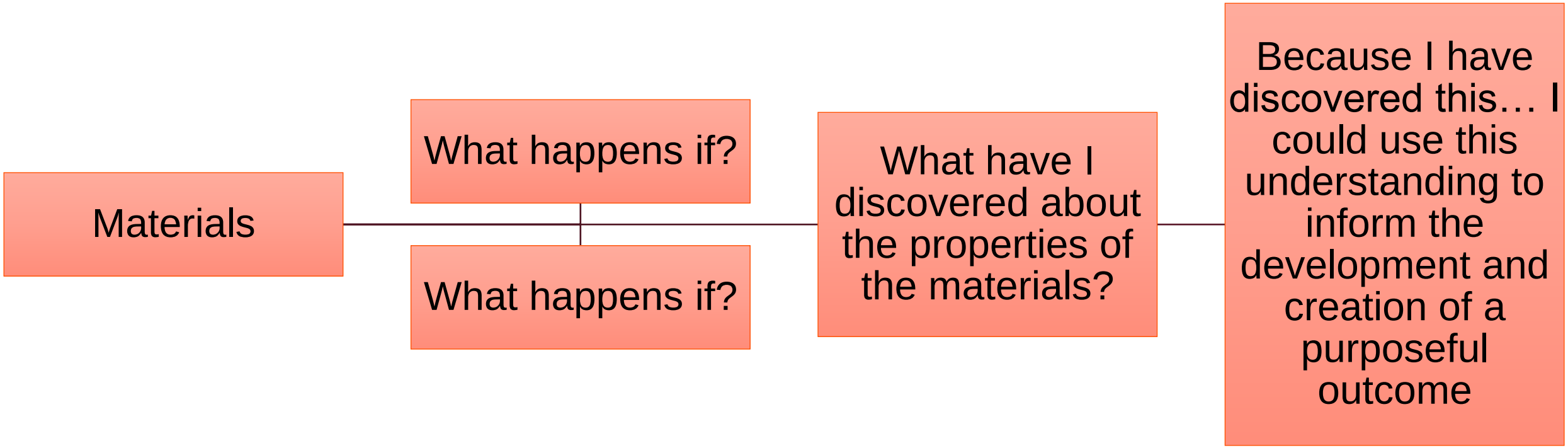
Does the programme of learning enable ākonga to discuss kaitiakitanga in the context of applying sustainable practices for the environment during the development of their design? **Refer to Explanatory Note 2:** As part of the evidence provided, students must include discussion of kaitiakitanga in the context of applying sustainable practices for the environment during the development of a design.				Have I discussed kaitiakitanga in the context of applying sustainable practices during the development of the design? Have I discussed the selection of materials during design development? Have I discussed the economic use of materials during design development? Have I discussed the appropriate disposal of waste materials during design development?
Does the programme of learning enable ākonga to use a design process for a person, whānau, or community that may include: • ongoing research • developing initial concept designs • refining and developing the design through ongoing research, developing initial concept designs, and refining initial concept designs during the creation of the design.				Have I carried out any ongoing research? Have I developed initial concept designs? Have I refined and developed initial concept designs informed by ongoing research? Have I refined initial concept designs during the creation of the design?

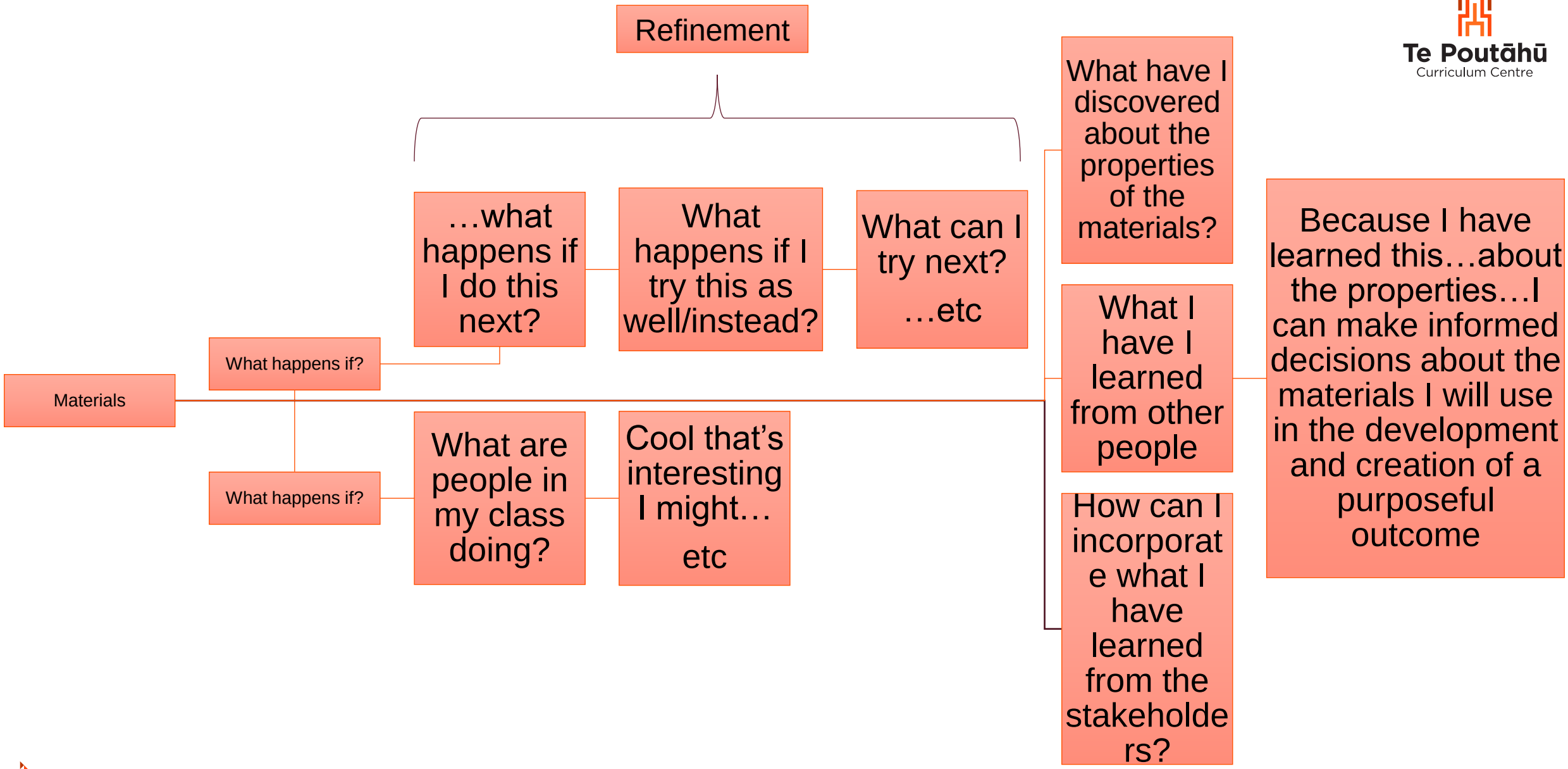
the creation of the design.				
For Merit, students are able to…				
Does the programme of learning enable ākonga to refine the application of sustainable practices to the development of the design for a person, whānau, or community? ○ E.g. will ākonga have the opportunity to discuss how ongoing research influences the selection of ingredients, components and other resources ○ will ākonga have the opportunity to discuss how further discovery about the economic use of materials generates additional efficiencies for how for how materials could be used, during the development of the design? ○ will ākonga have the opportunity to deepen understanding of the disposal of waste materials during the development of the design?				Have I refined the use of sustainable practices in the development for the design for a person, whānau or community? Have I carried out ongoing research that influences the selection of ingredients, components, and other resources for the design? Have I discovered additional information about the economic use of materials that has enabled me to refine the design? Have I deepened my understanding of how waste materials are disposed of and applied tis knowledge to my design?

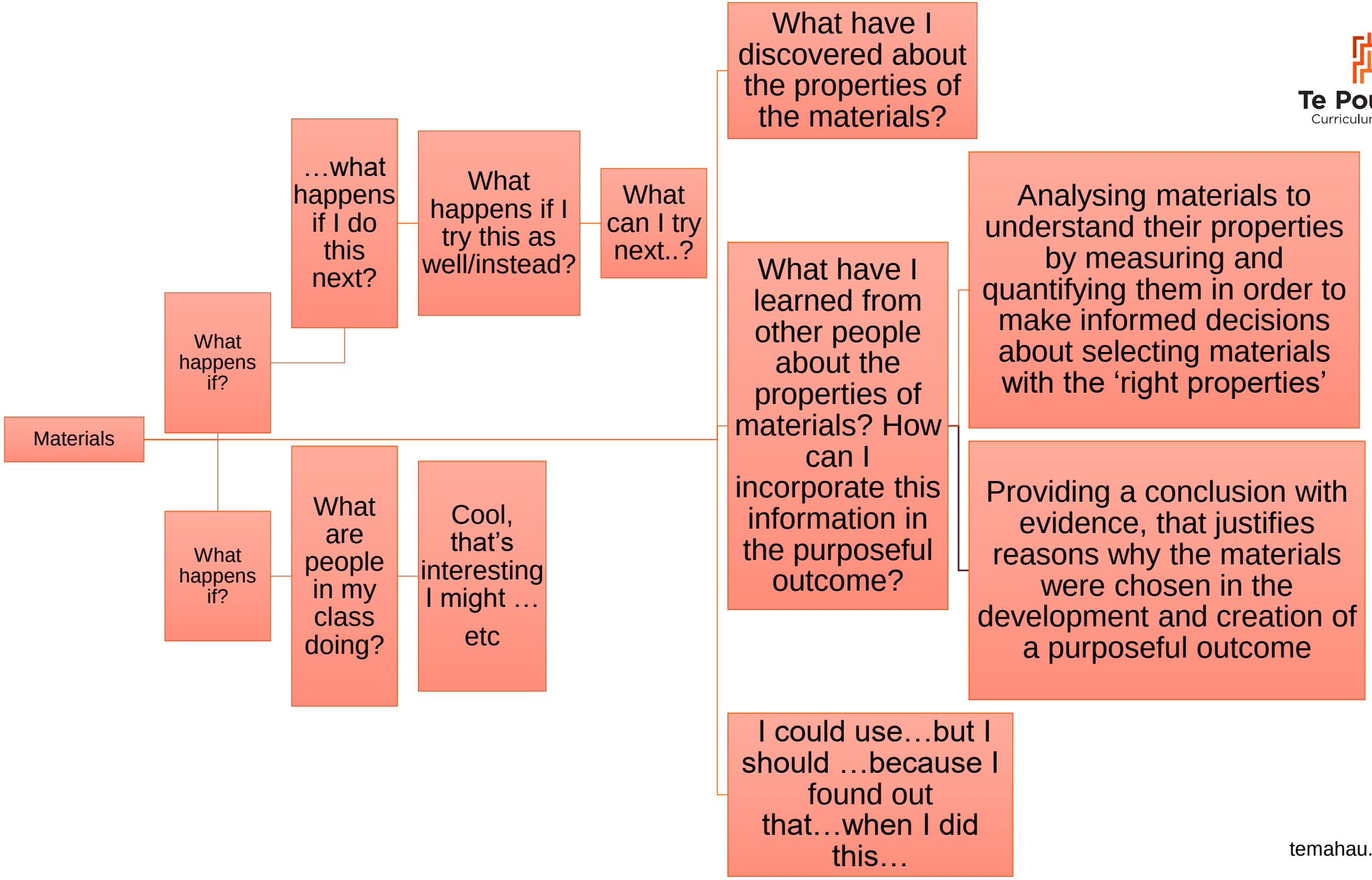
Does the programme of learning enable ākonga to seek, document, analyse, and apply stakeholder feedback to refine design development?				Have I sought, documented, analysed, and applied stakeholder feedback to inform decision making?
For Excellence, students are able to…				
Does the programme of learning enable ākonga to evaluate how stakeholder feedback informs design development in relation to the application of sustainable practices?				Have I evaluated how stakeholder feedback informed the application of sustainable practices during design development?
Does the programme of learning enable ākonga to evaluate how the feedback received from stakeholders informed decisions about the sustainable practices applied to the design?				Have I evaluated how stakeholder feedback informed sustainable practices applied to the design?

Achievement Standard 1.4 (92015): Demonstrate understanding of techniques selected for a feasible Materials and Processing Technology outcome (4 Credits)				
What is being assessed? **Describe, trial, and select appropriate techniques for a feasible Materials and/or Processing Technology outcome**				
To Achieve Students are able to…	**Yes**	**No**	**How will I scaffold teaching and learning of this concept?**	**Student questions (slide deck for curating evidence from course work)**
Does the programme of learning enable ākonga to identify a potential material and/or processing technology outcome	✓		within the context of customised. - unpack identifying a need - dig deep - why x5 - may not be the initial need.	Have I identified a feasible/potential Materials and Processing Technology outcome?
Does the programme of learning enable ākonga to investigate and trial appropriate techniques during the development of a feasible outcome, with the focus being on what is relevant. *Note: A feasible outcome is one that is capable of being created.*			use learning from Year 10 build on this - what techniques are needed for outcome - trial to see if they will work - ok if not all techniques will work - its about learning the could's and should's because	Have I investigated and trialled appropriate and relevant techniques during the development of a feasible outcome?
Does the programme of learning enable ākonga to describe, trial, and then select the most appropriate techniques for the feasible outcome?			- flow chart on wall for trialing - steps in the process. - build on junior school.	Have I described, trialled, and then selected the most appropriate techniques for a feasible outcome? describe + trial = select
• E.g will ākonga have the opportunity to consider the functional attributes of the technological outcome when selecting techniques to trial?			- teach difference between physical + functional, examples, practices. Revisit repeatedly to embed understanding	Have I considered the functional attributes of the feasible technological outcome when selecting techniques to trial? - jam jar activity

For Merit, students are able to…				
Does the programme of learning enable ākonga to compare the most appropriate techniques to inform decision-making in the refinement of the feasible outcome?	✓		- follow steps in flowchart - need for comparison - what is the purpose of the comparison? How does the trialling inform decision making?	Have I compared techniques to inform decision making?
Does the programme of learning enable ākonga to seek, document, analyse, and apply stakeholder feedback in decision-making for selecting techniques for a feasible outcome?			- who are they consulting - is the feedback valid are reliable? - does it support decision making?	Have I sought, documented, analysed, and applied stakeholder feedback to inform decision making?
For Excellence, students are able to…				
Does the programme of learning enable ākonga to analyse how trialling, appropriate techniques, and stakeholder feedback connect to inform and improve the feasibility of the outcome?			- make connections between - - table, spider diagram venn diagram?	Have I analysed how trialling appropriate techniques and stakeholder feedback connect to inform and improve the feasibility of the outcome?


Materials
What happens if?
What happens if?
What have I discovered about the properties of the materials?
Because I have discovered this… I could use this understanding to inform the development and creation of a purposeful outcome


Refinement
Materials
What happens if?
What happens if?
…what happens if I do this next?
What happens if I try this as well/instead?
What can I try next?
…etc
What are people in my class doing?
Cool that's interesting I might…
etc
What have I discovered about the properties of the materials?
What I have I learned from other people
How can I incorporate what I have learned from the stakeholders?
Because I have learned this…about the properties…I can make informed decisions about the materials I will use in the development and creation of a purposeful outcome


Materials
What happens if?
…what happens if I do this next?
What happens if I try this as well/instead?
What can I try next..?
What happens if?
What are people in my class doing?
Cool, that's interesting I might …
etc
What have I discovered about the properties of the materials?
What have I learned from other people about the properties of materials? How can I incorporate this information in the purposeful outcome?
Analysing materials to understand their properties by measuring and quantifying them in order to make informed decisions about selecting materials with the 'right properties'
Providing a conclusion with evidence, that justifies reasons why the materials were chosen in the development and creation of a purposeful outcome
I could use…but I should …because I found out that…when I did this…

Verb definitions

Analyse	To examine the nature or structure of something, by separating it into its parts, in order to understand or explain it.
Applying	To make use of.
Compare	To show how things are similar or different.
Connect	To relate one thing to another.
Consider	To think about or take into account.
Create	To make something new.
Design	To decide and show how something will look or be arranged.
Develop	To build upon, change, or create a product, concept, or idea.
Demonstrate	To show by example or through evidence.
Discuss	To talk or write about something in detail considering different ideas and opinions related to it.
Enhance	To increase or improve value or quality.
Evaluate	To make a judgement based on criteria, determine the value with reasons.
Explain	To make know the cause or detail of something.
Experiment	In Materials and Processing Technology, *experimentation* refers to trying out ideas or methods for the purpose of discovery.
Explore	To take time to play, tinker with and investigate.
Examine	To look at in detail.
Investigate	To plan, inquire into and draw conclusions about.
Justify	To support an argument or conclusion with evidence.
Predict	To make a statement about what might happen in the future based upon existing knowledge.
Record	To collect information in a reproduceable form, including drawn, written, filmed, or photographed information.
Refine	To improve an idea, method, system etc. by making considered changes.
Research	To collect and consider information about something.
Seek	To deliberately search or ask for new information or ideas.
Select	To choose or single out.
Test	To try something out in order to obtain more information.
Use	To carry out a purpose or action by means of.

Invitation

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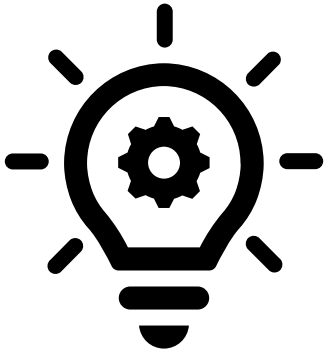
In the chat share:



- One thing you have learned from this presentation.
- What is the first thing you will do, as a result of this presentation?
- Do you still have a question or wondering about Subject Learning Outcomes?

Technology Subject Associations:

Te Poutāhū
Curriculum Centre

[TENZ – Technology Education New Zealand]

[HETTANZ Website]

[New Zealand Graphics & Technology Teachers Association – NZGTTA is a professional subject association set up to promote and support teachers of Graphics and Technology in New Zealand schools.]

[dthm4kaiako.ac.nz]

Te Poutāhū
Curriculum Centre

Te Mahau

We **shape** an **education** system that delivers **equitable** and **excellent outcomes**

He mea **tārai** e mātou te **mātauranga** kia **rangatira** ai, kia **mana taurite** ai ōna **huanga**

temahau.govt.nz **education.govt.nz**

Te Tāhuhu o te Mātauranga
Ministry of Education

Te Kāwanatanga o Aotearoa
New Zealand Government