**Science Capabilities Progression**

Students make progress when they can demonstrate greater capability in using evidence to support their claims. For this to happen they need to encounter tasks that stretch them, yet are achievable. A mix of the aspects in the task design will determine its overall difficulty level for students. The table contrasts features more typical of Level 1 and 2 tasks with those students might encounter at level 5. Level 3 and 4 tasks/contexts will combine some easier and some more demanding features.

**Gather and Interpret Data**

|  |  |
| --- | --- |
| **Aspect of task at level 1/2** | **Aspect of task at level 5** |
| **Framing of task**  The task has been shaped to eliminate ambiguity: what is displayed directs attention to what needs to be observed: e.g. a simple clear line drawing, a very carefully framed photograph, a purposefully selected simple object, a very simple identification key.  The sense(s) and observation tools involved  are clearly identified for the students.  The task involves use of simple familiar language to talk about the act of observing and making meaning: e.g. “I see…, I think.., I wonder…” | **Framing of task**  The task is open to interpretation because it is not self-evident what the focus of the observation/data gathering should be, or why: e.g. a ‘busy’ photograph, a compound image with a number of different elements, a real thing with many different features, a complex identification key.  The task may require students to make choices about observation methods and tools.  The task requires students to explicitly differentiate between when they (or scientists) are shaping an observation and when they are making an inference.  Some tasks will challenge students to shape testable hypotheses from their inferences.  Some tasks might provide opportunities to explore instances where indirect observations must be made because more direct methods cannot be used. |
| **Choice of context**  The context is likely to be familiar or easily associated with something that is already familiar to many students.  The context can be readily accessed. | **Choice of context**  A wider range of contexts will be used: some familiar, some less so.  The context might present an unexpected or surprising aspect of something so familiar that it tends to be taken for granted. |
| **Prior science knowledge**  The task uses everyday ideas and language, or very simple and familiar science ideas, to give meaning to the observation focus. | **Prior science knowledge**  The task draws on students’ prior science knowledge of relevant concepts. These act as a guide to what it might be important to observe, or what data might be relevant to gather. |
| **Metacognitive awareness**  Tasks encourage students to talk about the thinking they do as they make observations or gather data. In this way they build awareness of when they are being careful observers and meaning-makers. | **Metacognitive awareness**  The task provides opportunities for students to talk about instances when inferences are central to meaning-making (either their own and that of others, including scientists). |

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**Use Evidence**

|  |  |
| --- | --- |
| **Aspect of task at level 1/2** | **Aspect of task at level 5** |
| **Framing of task**  The task has been shaped to eliminate ambiguity – what is displayed directs attention to the relevant evidence.  e.g. a simple summary of what scientists noticed, or a table to record evidence if drawing on their own investigation  The relationship between the evidence and the claim is likely to be simple and direct.  The task involves use of simple familiar language and questions as students talk about what the evidence is telling them: e.g. How do you know…? How could you check…?  There are opportunities for practicing evidence-based talk: e.g. I think… because… | **Framing of task**  The task is open to interpretation because some aspect of the evidence cannot be taken for granted.  e.g. when there is not enough evidence to be convincing, when evidence refutes predictions, when additional evidence requires existing theories to be reconsidered.  The task is likely to require students to consider multiple pieces of evidence before making a judgment.  Some tasks require students to explore instances of disconfirming evidence, or conflicting evidence.  These ideas introduce an element of uncertainty that students need to acknowledge and manage. |
| **Choice of context**  The context is likely to be familiar or easily associated with something that is already familiar to many students.  The context can be readily accessed. | **Choice of context**  A wider range of contexts will be used: some familiar, some less so.  The context might present an unexpected or surprising aspect of something so familiar that it tends to be taken for granted. |
| **Prior science knowledge**  The task uses everyday ideas and language, or very simple and familiar science ideas, to give meaning to the evidence and the idea(s) the evidence supports. | **Prior science knowledge**  The task draws on students’ prior science knowledge of relevant concepts. These act as a guide to what it might be important to draw on as evidence. |
| **Metacognitive awareness**  Reflective talk about the task raises students’ awareness of what can count as evidence. | **Metacognitive awareness**  Reflection provides opportunities to increase students’ awareness of instances when they are weighing up evidence before making a decision.  Students have opportunities to talk about what it feels like to make evidence-based decisions. |

**Science Capabilities Progression**

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**Critique Evidence**

|  |  |
| --- | --- |
| **Aspect of task at level 2** | **Aspect of task at level 5** |
| **Framing of task**  The task has been shaped to eliminate ambiguity: what is displayed directs attention to one aspect of an inquiry where critical thinking might be needed.  The task involves use of simple familiar language to ask critical questions about an investigation: e.g. How could you check? How will we know when we have enough data? | **Framing of task**  The task is open to interpretation because it is not self-evident what the focus of critique should be, or why.  The task requires student to identify and think critically about all the relevant phases of an inquiry  Tasks are shaped to highlight features of investigations that confer validity and reliability to data-based claims.  Some tasks expose students to the inevitability of measurement error and how this can be appropriately managed.  Students have opportunities to discuss the importance of transparency and the role played by data gathering protocols.  More than one data gathering method might be relevant: in this case students have opportunities to compare advantages and drawbacks of different investigative methods. |
| **Choice of context**  The context is likely to be familiar or easily associated with something that is already familiar to many students.  The context can be readily accessed. | **Choice of context**  A wider range of contexts will be used: some familiar, some less so.  The context might present an unexpected or surprising aspect of something so familiar that it tends to be taken for granted. |
| **Prior science knowledge**  The task draws on everyday ideas and language or very simple and familiar science ideas. | **Prior science knowledge**  Students’ prior science knowledge of relevant concepts acts as a guide to critical questions about methods used to gather evidence and make evidence-based claims. |
| **Metacognitive awareness**  Tasks encourage students to talk about their critical thinking. | **Metacognitive awareness**  Tasks include opportunities for students to talk about when they are sceptical of claims, and whether they do choose the most appropriate times to question claims.  Tasks include opportunities for students to reflect on the values and feelings associated with a disposition to be sceptical of claims.  There are opportunities to contrast critique of knowledge claims with the more usual presentation of school science as “‘correct facts”. |

**Science Capabilities Progression**

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**Interpret Representations**

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| --- | --- |
| **Aspect of task at level 1/2** | **Aspect of task at level 5** |
| **Framing of task**  The task draws on everyday representations (photos, drawings, everyday speech and words etc.)  The task involves use of simple familiar language to talk about how the intended meaning is being conveyed: e.g. The wobbly lines show how... A good word for this is ... I put those together because.... | **Framing of task**  The task provides opportunities to compare and contrast everyday representations of ideas and scientific ways of representing those same ideas.  The task may require students to make and justify choices about the most appropriate representation to use in a specific context.  The task allows students to explore and discuss  the conventions of science, and what these conventions convey about the cultural practices of science.  Students have opportunities to practise using conventions appropriately as they construct their own representations. |
| **Choice of context**  The context is likely to be familiar or easily associated with something that is already familiar to many students.  The context can be readily accessed. | **Choice of context**  A wider range of contexts will be used: some familiar, some less so.  The context might present an unexpected or surprising aspect of something so familiar that it tends to be taken for granted. |
| **Prior science knowledge**  The task uses everyday ideas and language, or very simple and familiar science ideas to explore and practise ways of making meaning. | **Prior science knowledge**  The task uses students’ prior science knowledge of relevant concepts to explore and practise ways of making meaning.  The disciplinary knowledge also acts as a guide to the selection of relevant conventions for purposes of comparing and contrasting. |
| **Metacognitive awareness**  Tasks encourage students to talk about their thinking about how different representations can show different things. | **Metacognitive awareness**  The task provides opportunities for students to demonstrate their awareness of their meaning-making choices and of differences between scientific and everyday meaning-making practices. |

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**Engage with Science**

# Opportunities to learn at different curriculum levels

To become increasingly independent, capable, and positively disposed to engage with science, students need to encounter tasks that stretch them, yet are achievable.  A mix of the aspects in the task design will determine how much challenge they are given.

Science in NZC aims to support all students to be ready, willing and able to engage with science. They show progress when they become increasingly independent in drawing on a widening and more complex combination of the science capabilities.

To become increasingly independent, capable, and positively disposed to engage with science, students need to encounter tasks that stretch them, yet are achievable.  A mix of the aspects in the task design will determine how much challenge they are given.

* Think about how the other capabilities need to be engaged to achieve the task. Have the students had opportunities to develop and practice relevant aspects of all the capabilities they will need?
* How much structure do you need to provide? Less capable students may need carefully scaffolded support to achieve the action envisaged. However growing independence does require that students are given opportunities to decide and act for themselves when it is appropriate and safe to do so.
* Consider how open the task is to interpretation. More demanding tasks will not have one obvious course of action. In the most challenging cases it might not be possible to arrive at a “best” solution because different interests come into conflict and students need to make an on-balance, value-based judgment.
* Consider whether knowledge and skills from other curriculum areas will need to be introduced. Sometimes the connections will be quite obvious but in more challenging tasks a web of less visible connections might need to be brought into view.
* What sort of thinking does the task demand? Young students can be supported to make simple values judgments, but abstract ethical reasoning is obviously more demanding in itself and will also lead to more challenging reflection tasks.