Investigating in Primary Connections

Investigating is one of the five underpinning principles of the Primary Connections programme. It is specifically contained in the definition of scientific literacy used by Primary Connections which includes the capacity to:

‘be able to identify questions, investigate and draw evidence based conclusions’.

Investigating is embedded in the Primary Connections 5Es teaching and learning model and is exemplified in the curriculum units from Early Stage 1 to Stage 3 and across all strands: Earth and Beyond, Life and Living, Energy and Change, and Natural and Processed Materials. Students’ investigating skills develop as they progress through primary school and this is reflected in the nature and increasing complexity of the investigations. The shift from teacher-guided to student-planned investigations correlates with the development of investigating skills.

Types of investigating

The type and complexity of the investigation is dependent on the phase, the stage level and the context of the curriculum unit.

Investigating at the ENGAGE and EXPLORE phases

The focus of the Engage phase is to engage students and elicit prior knowledge. The focus of the Explore phase is to provide hands-on experience of the phenomenon. Exploratory investigations are featured at the Engage and Explore phases.

**Exploratory investigations:** Students gain hands-on experiences of science phenomena which require them to make and record observations of objects and/or events. These investigations engage students with the phenomena, stimulate curiosity, raise questions and develop observation and representation skills. They lay the foundation for developing explanations of the science phenomena.

Investigating at the ELABORATE phase

The focus of the Elaborate phase is to extend understanding to a new context or make connections to additional concepts through a student-planned investigation.

At Early Stage 1 and Stage 1, students have structured experiences of investigating where the teacher leads them through the process step by step. By Stage 2 and Stage 3, as skills develop, students have increasing opportunities to plan and conduct an investigation within the context of the unit where the teacher's role is that of a facilitator, guiding the process. Students have input into making decisions about choosing and writing questions for investigation, designing the investigation, collecting data, recording results, interpreting and representing results, drawing conclusions and communicating findings.
Four main types of investigation can be found at the *Elaborate* phase.

**Fair test investigations:** Students have experiences of a science phenomenon where factors or variables are changed, measured and kept the same. Explanations and conclusions are directly related to the changed variable.

**Survey investigations:** Students observe phenomena or carry out surveys, seek patterns in the results, represent and communicate their findings.

**Design investigations:** Students are given a problem or brief and are required to design, make and appraise an object or a system and communicate their results. These often feature a combination of science and technology.

**Secondary data investigations:** Students research, analyse, explain and represent secondary data (data collected by others) about phenomena.

**Primary Connections investigation planners**

Primary Connections uses two types of investigation planners which reflect the progression of skills from Early Stage 1 to Stage 3. Explicit instruction about investigating and using the planners is contained in the units:

- Investigation planner: Early Stage 1 and Stage 1
- Investigation planner: Stage 2 and Stage 3.

Additional teacher support is available in the Appendices:

- How to conduct a fair test
- How to write questions for investigation
- How to organise cooperative learning teams.

**Skills of investigating**

Primary Connections explicitly helps students develop the following skills.

Students:

- **Plan** the investigation and make predictions
- **Conduct** the investigation and record results
- **Interpret** the findings and **represent** results in an appropriate way
- **Evaluate** the investigation by developing explanations and drawing conclusions based on the evidence
- **Communicate** findings.
Investigating in Primary Connections

An elaboration of the skills of investigating

Planning
- Develop the question for investigation
- Identify variables
- Choose variables to change, measure and keep the same (in fair test investigations)
- Make predictions
- Plan the materials, equipment and steps.

Conducting
- Conduct the investigation activity
- Observe, measure and calculate
- Collect evidence
- Record and organise data.

Interpreting and representing
- Think about results and the question
- Look for patterns in the results
- Represent results in appropriate ways, such as: data tables, charts, graphs, diagrams.

Evaluating
- Develop explanations for the results based on evidence
- Analyse results in relation to the question
- Reflect on the investigating process and look for improvements.

Communicating
- Use appropriate representations for the findings of the investigation
- Present findings to an audience
- Talk about the evidence
- Explain the ‘How we know’ of the TWLH chart. Present the evidence which supports what has been learnt.
Exploratory investigations in PrimaryConnections curriculum units

Exploratory investigations occur at the Engage and Explore phases of PrimaryConnections curriculum units through all strands and stages. The table below shows examples of curriculum units and specific lessons which feature exploratory investigations.

<table>
<thead>
<tr>
<th>STAGE</th>
<th>Earth and Beyond</th>
<th>Life and Living</th>
<th>Energy and Change</th>
<th>Natural and Processed Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARLY STAGE 1</td>
<td>Weather in my world</td>
<td>On the move</td>
<td>What’s it made of?</td>
<td></td>
</tr>
<tr>
<td>Lesson 2</td>
<td>Lesson 3: Weather watchers</td>
<td>Lesson 3: Playground play</td>
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</tr>
<tr>
<td>STAGE 1</td>
<td>Water works</td>
<td>Schoolyard safari</td>
<td>Push-pull</td>
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</tr>
<tr>
<td>Lesson 3: Rain, rain</td>
<td>Lesson 1 Session 2: In my schoolyard</td>
<td>Lesson 4: What sinks? What floats?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAGE 2</td>
<td>Spinning in space</td>
<td>Plants in action</td>
<td>Material world</td>
<td></td>
</tr>
<tr>
<td>Lesson 3: Shadows at play</td>
<td>Lesson 2: What’s inside a seed?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAGE 3</td>
<td>Marvellous micro-organisms</td>
<td>It’s electrifying</td>
<td>Package it better</td>
<td></td>
</tr>
<tr>
<td>Lesson 1 Session 1: Exploring bread</td>
<td>Lesson 1: What makes it go?</td>
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</tbody>
</table>

(The italicised title is the unit and the non-italicised title is the specific lesson.)
Fair test, Survey, Design and Secondary data investigations in Primary Connections curriculum units

Fair test (FT), Survey (S), Design (D) and Secondary data (SD) investigations occur at the Elaborate phase of Primary Connections curriculum units. Teacher judgment about the level of support required for students as they conduct investigations is crucial. For example, following a guided investigation, a teacher might provide opportunities for students to plan and conduct their own investigation within the boundaries of the context of the topic. The table below shows examples of curriculum units and specific lessons which feature fair test, survey, design and secondary data investigations.

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<td></td>
<td>Lesson 6</td>
<td></td>
<td>Lesson 6</td>
<td>Lesson 5: Waterproof wonders (FT)</td>
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<td></td>
<td>Session 2: Using wind meters (FT)</td>
<td></td>
<td>Session 2: Roll on (FT)</td>
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<td>STAGE 1</td>
<td>Water works</td>
<td>Schoolyard safari</td>
<td>Push-pull</td>
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<td></td>
<td>Lesson 6</td>
<td>Lesson 6: Habitat detectives (S)</td>
<td>Lesson 7: Helicopter test flights (FT)</td>
<td>Lesson 6: Investigating insulation (FT)</td>
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<td>Investigating water use at home (S)</td>
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<td>Lesson 7: Investigating conditions for plant growth (FT)</td>
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<td>Lesson 5: Earthquakes downunder (SD)</td>
<td>Lesson 6: Problem solvers; What’s it all about? (FT)</td>
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<td>Lesson 6: Daring designs (D)</td>
</tr>
</tbody>
</table>

(The italicised title is the unit and the non-italicised title is the specific lesson.)

References