



TEACHING & LEARNING RESEARCH INITIATIVE

NĀU I WHATU TE KĀKAHU, HE TĀNIKO TAKU

Overview

Teaching primary science and technology: Ideas from the InSiTE project

This resource is based on some of the findings related to teacher knowledge for primary teachers from a Teaching and Learning Research Initiative (TLRI) project, The Classroom InSiTE Project: Understanding Classroom Interactions to Enhance Teaching and Learning in Science and Technology in Years 1–8. The research team was Bronwen Cowie, Judy Moreland, Kathrin Otrell-Cass and Alister Jones.

Aims of the study

The project centred on Years 1–8 teachers and their students in science and technology classrooms over three years. It examined:

- interactions that support learning in science and technology
- connected and coherent teaching and learning of science and technology
- student understandings of the nature of science and technology
- subject ideas, skills and pedagogies that teachers see as important for student learning in science and technology, and their impact on classroom interactions.

Why was the study important?

Science and technology play important roles in our world. What students learn about science and technology at primary school lays a foundation for their development as informed, critical, responsible citizens.

What matters is what teachers know and do when they are with their students.

To respond productively to student learning, teachers need to understand possible student learning pathways, assess and understand current student understandings and skills, and move student learning forward by using appropriate teaching strategies and assessment practices.

What matters is that teachers are reflective and inquire into their practice. For teachers to become discerning practitioners they need to reflect on their teaching, be open to improving their practice and make appropriate changes to enhance student learning.

What matters is what teachers learn. To enhance the teaching of science and technology, teacher professional development needs to focus on how students learn science and technology, specific ways to teach science and technology, and teacher knowledge of science and technology ideas and skills.

Teachers and researchers worked together

For three years teachers and researchers worked together in the classrooms as the teachers taught science and technology. The researchers took notes, videoed lessons, photographed the teachers and students working together and gathered any teacher documents, student work and class lesson materials. The teachers and students talked with the researchers and these discussions were taped. Teachers and researchers also met regularly between the classroom teaching episodes where we reflected on what had happened and together planned our next steps.

Further reading

Cowie, B., Moreland, J., Otrell-Cass, K., & Jones, A. (2008). Making connections in the teaching of science and technology. **set: Research Information for Teachers**, 3, 42–44.

Cowie, B., Moreland, J., Otrell-Cass, K., & Jones, A. (2008). More than talk and writing: Exploring the multimodal nature of classroom interactions. **set: Research Information for Teachers**, 3, 45–48.

Moreland, J., Cowie, B., Jones, A., & Otrell-Cass, K. (2008). Developing teacher knowledge in primary technology. **set: Research Information for Teachers**, 3, 38–41.

What's in this resource?

Booklet 1: Planning for learning: Building knowledge for teaching primary science and technology

Teachers need to know how to change their own science and technology subject ideas into a form that students can grasp, and how to change their general teaching practices to more specific science and technology approaches. Using a two-part subject-specific planning template helped the InSiTE teachers to do this (Figure 1).



Figure 1. Planning together in a meeting

Part 1 of the planning template helped teachers work out the particular science and technology ideas and skills they wanted their students to learn. Part 2 helped the teachers work out the specific science and technology teaching approaches they would use.

This booklet includes an explanation of the components of the planning template, examples of completed plans and teacher commentary on the impact of using the planning framework. There are prompt questions and suggestions for teachers to try out, plus the URL for a digital copy of the blank planning template.

Booklet 2: Interactions in science and technology classrooms

This booklet illustrates the multimodal nature of interactions between teachers and students in primary science and technology.

We found that when teachers made use of tasks that provided students with opportunities to make and express meaning through combining several modes, such as engaging with images, drawing, talking, dramatisation, writing and making products, students became actively involved in building and making meaning. These multimodal interactions helped teachers and students work together to negotiate and create shared understandings (Figure 2).



Figure 2. Teacher and students working together to draw a plan

Teachers were able to provide richer feedback when they used multiple modes in their interactions with students. It also helped to provide students with multiple ways to represent, engage with and make sense of their world.

Teachers used artefacts, such as worksheets and templates, real-life artefacts and wall displays, to provide settings and resources for interaction with students. In

whole-class settings, easily visible and accessible artefacts directed, guided and supported interactions between students and across locations and time. Artefacts helped students work together in groups and provided guidance in the absence of a teacher. However, the influence of any artefact on student learning depended on how the teachers introduced it to the students and how it was integrated into interaction.

This booklet includes examples that tease out the multiple modes used by teachers and students during their interactions. There are prompt questions and suggestions for teachers to try out.

Booklet 3: Developing designerly thinking in technology



Figure 3. Teaching drawing skills to support designerly thinking

This booklet focuses on technology. It unpacks key aspects of how teachers can support their students' design thinking by helping students to consider the relationships between form and function. In particular, it elaborates on the way drawing as a knowledge-based act can contribute to the development of student technological thinking.

There is value in teachers directly teaching graphical drawing skills and drawing with their students (Figure 3). There are prompt questions and suggestions for teachers to try out.

Booklet 4: Teachers talking to teachers: Stories from InSITE classrooms



Figure 4. Scaffolding students through a technology process

The InSITE teachers were keen to share some of what they had learnt with colleagues outside the project. Here they share their discoveries about:

- scaffolding to support Year 1 students to design and make a kite (Figure 4)
- co-constructing meaning with students through an adjustable classroom wall display about scientific classification
- guiding students through product analysis and detailed construction planning for a musical instrument
- using a diagram as an anchor to help students revisit and refine their ideas on adaptation
- integrating summative assessment into the process of a technology unit.

The stories are an eclectic mix because each teacher selected a story they thought would be of interest and value for other teachers.