

Teacher Education Programme

Strategies for Assessment of Inquiry Learning in Science

KING'S
College
LONDON



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SAILS
Strategies for Assessment of
Inquiry Learning in Science

Session 1: What is Inquiry?



Exploring Inquiry in Science

- What is Inquiry?
- What does it look like in science classrooms?
- How does it help students learn in science?

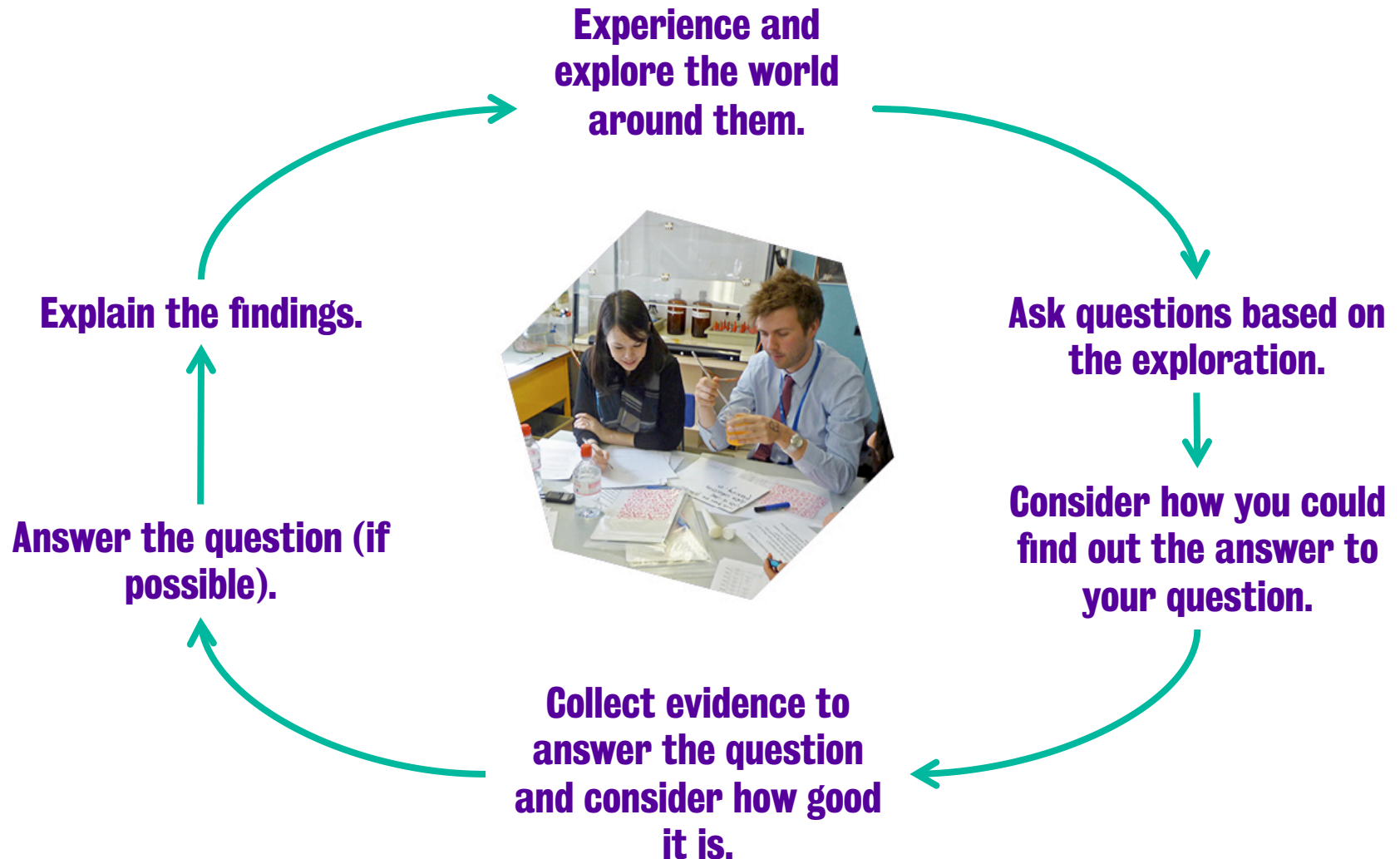


Inquiry in Science Classrooms

In classrooms, science inquiry might involve:

- problem solving
- planning and carrying out investigations
- looking for patterns in data sets
- making observations, predictions and inferences
- asking questions, researching and testing out ideas
- sharing and challenging ideas and reaching a consensus
- developing conceptual understanding
- strengthening process skills
- learning about the nature of science

Inquiry in Science



Why is inquiry-based learning not widespread?

- 1) Variations in the definition of inquiry-based learning
- 2) A lack of robust research evidence demonstrating the positive impacts of learning through inquiry
- 3) Teacher preparation must cover understanding about inquiry as well as the necessary PCK to teach through inquiry
- 4) Science departments need to be appropriately resourced
- 5) Assessment issues not considered

Yeomans, E. (2011) *Perspectives on Education: Inquiry-based learning* London: Wellcome

School Science Practical Work

- Generally practicals are presented as recipes to follow so that students experience scientific phenomena
- The raising of questions about phenomena lies with the teacher rather than the student
- Most practicals involve the student in collecting and presenting data that is made sense of by the teacher
- Practicals may not aid conceptual development nor development of inquiry skills

Harrison, C (2014) Assessment of Inquiry Skills in the SAILS Project *Science Education International* Vol. 25, 1, p112-122

Reflecting on Practice

- What does practical work look like in your classroom?
- How much inquiry is done in your classroom?
- What can be done to strengthen inquiry in schools?



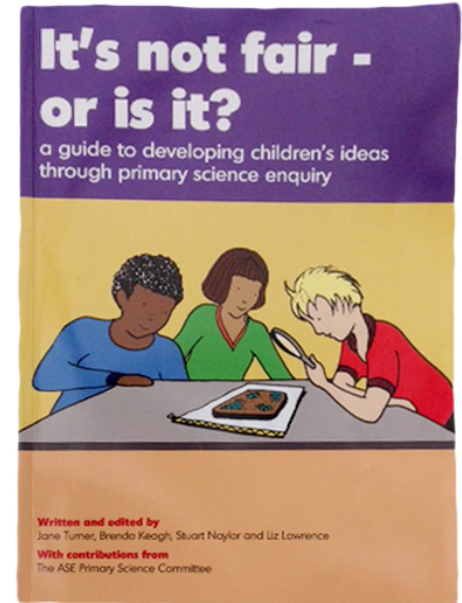
Findings from the SAILS project

- Teachers made room for inquiry within the curriculum
- Teachers learned more about their students capabilities and generally were surprised by what they could do
- Teachers realised that they can assess throughout the inquiry and not just assess the product

Types of Inquiry

- Identify what type of inquiry each activity is focusing on
- How has this activity changed your view of inquiry?
- How could similar types of inquiry be used at lower secondary school?

Activities taken from: Turner, J., Keogh, B., Naylor, S. & Lawrence, L. (2011). *It's not fair - or is it? a guide to developing children's ideas through primary science enquiry*. Millgate House Education and The Association for Science Education. England.



Types of Inquiry

- Observing over time – Puddles evaporating
- Identifying and classifying – Alive, not alive, never alive
- Pattern seeking – Surveying a field
- Research – Water cycle
- Controlling variables (fair testing) – Pulse rate

Types of Inquiry

Are there other types of inquiry that might be appropriate for your students?



Exploring Inquiry Activities

On the SAILS project, we adapted four inquiry activities to encourage students to take a more active role in the inquiry process.

These are:

- **Floating Orange**
- **Leaf Temperatures**
- **Cooked Spaghetti**
- **Cookie Mining**



Raising Questions

Floating Orange



Pupil Questions

- What makes the fruit sink or float?
- Can you make the floating fruit sink or the sinking fruit float?
- Does floating change if you take off the skin? bake it? break it into pieces/ squash it? put holes in it?
- Why does a peeled orange always float the same way up?
- Will it float differently in salt water? hot water? Iced water?
- Does changing the water depth alter how the fruit floats?

Using Novel Equipment in a New Context

Leaf Temperatures



Observation, Measurement & Inference

Cooked Spaghetti



Critiquing Methods

Cookie Mining

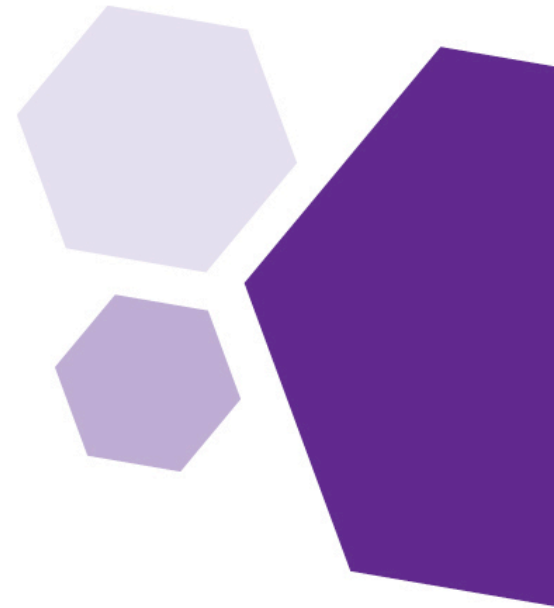


Reflecting on your Inquiry

- How did you do your inquiry?
- Was this similar to other groups?
- How successful were you in each inquiry?
- What factors led to this?
- How often did you make changes from your first ideas?

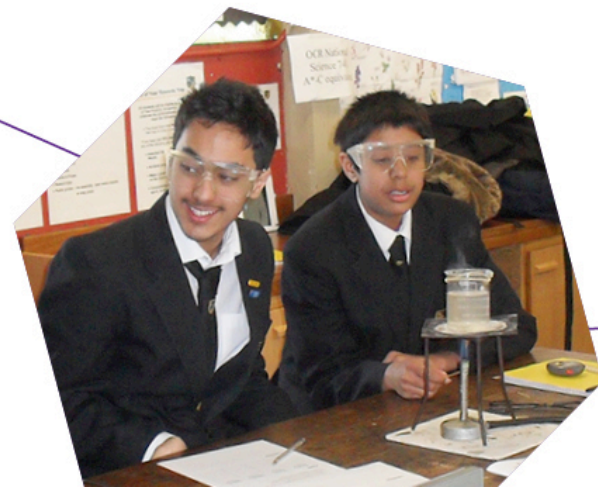
Reflection on the 4 Inquiries

- These FOUR inquiries were designed to help you focus on inquiry skills that usually get missed in practical classrooms
- How might these inquiries work in your classroom?
- What do you do need to put in place for them to work well?



Action Plan

- Try out one or more of the inquiry activities from today with one class
- Think about how you can prevent the inquiry being closed down
- Keep a record of your experiences and reflections to share



References

- Harrison, C (2014) Assessment of Inquiry Skills in the SAILS Project *Science Education International* Vol. 25, 1, p112-122
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