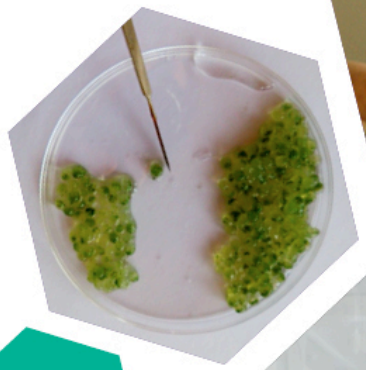
Teacher Education Programme

Strategies for Assessment of Inquiry Learning in Science



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SAILS
Strategies for Assessment of Inquiry Learning in Science

Session 2: Assessing and developing enquiry

Objectives of Session

- to share ideas of how successful the inquiry activities were in your classrooms
- to recognise how learning by inquiry is different from other types of practical lesson
- to workout how you might use assessment during the inquiry to evidence learning and areas for improvement
- to trial three inquiry units designed to promote conceptual development through inquiry

Outline of Session

- Reflection on Classroom Inquiries
- Classroom Assessment Model
- Exploring Inquiry Activities
- Collecting Evidence of Learning
- Planning Next Steps

Teacher Feedback on Classroom Inquiries

- Which inquiries did you try? Why these?
- Which inquiry skills did the students focus on?
- How did the students respond to the inquiry activity?
- What evidence of learning did you notice?

Findings from the SAILS project

- Assessment in inquiry activities is best done during the inquiry to provide feedback so that improvements can be made as the activity progresses
- Probing questions help teachers and students in assessing understanding of inquiry skills and processes
- Students can improve their conceptual understanding through an inquiry approach

Definition of Assessment for Learning (formative)

- This is classroom assessment which focuses on the learning as it is taking place and its function is to bring about improvement
- Both teachers and learners need to be involved but ultimately it is the learner who has to take action

(Harrison & Howard 2009)

Classroom Assessment Model

- Formative assessment during the inquiries
- Collect evidence of learning of inquiry skills and learning achieved through inquiry
- Provides opportunity for feedback to individual students and groups on their growing inquiry competences
- Challenges students to consider the idea and path they have decided to take
- Informs students where to direct their efforts

Assessment of Classroom Inquiries

- What did you notice about inquiry skills students found easy and those they found difficult in the inquiries you tried in your classroom?
- Did you ask any specific questions or use any way of collecting evidence of learning in the inquiries you tried in your classroom?

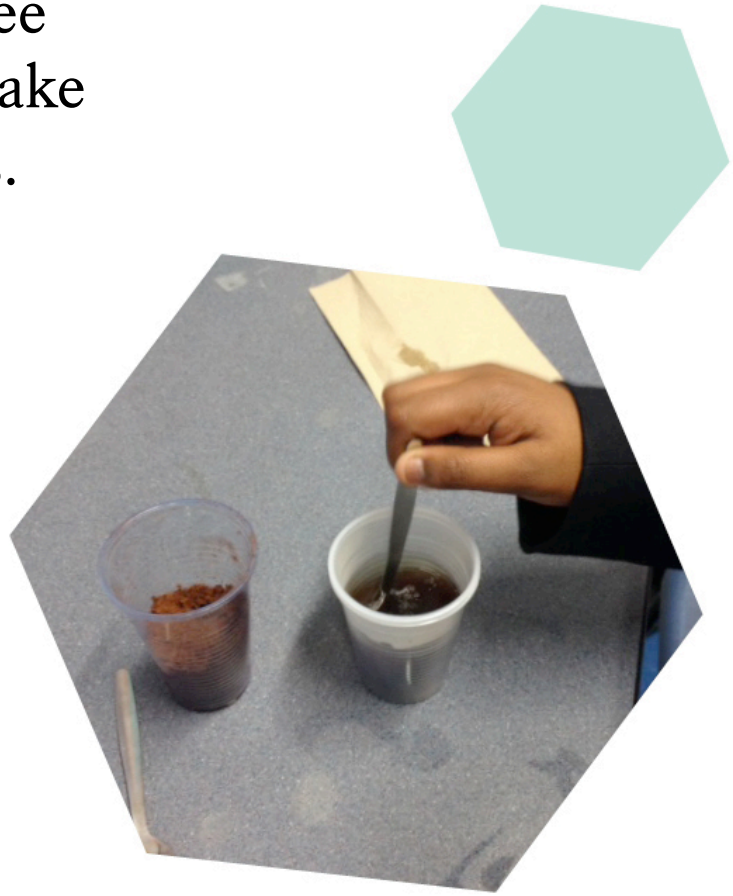
Summative Assessment

- Happens occasionally at key points in development
- Classroom evidence, collected over several inquiries, is summarised to construct a picture of progress for individual students or groups
- Sometimes additional tasks are used to check on individual student or group progress

Exploring Inquiry Activities

On the SAILS project, we designed three inquiry Units to encourage students to take a more active role in the inquiry process. These are:

- Food Labels Inquiry
- Reaction Rates Inquiry
- Speed Inquiry



Food labels Inquiry

- This inquiry contains a number of exercises to help students focus on proportion and composition of different foods
- Try a couple of the activities and consider how these help students think and reason in an inquiry way

Unpacking Food labels Inquiry

- Consider the conceptual ideas being developed
- How are the activities in this inquiry helping students think and reason about a balanced diet?
- How might students share their ideas in these activities?
- Which questions or ways of collecting evidence of learning might you use in these activities?

Reaction rates Inquiry

In this activity, the inquiry question is set in a problem solving context.

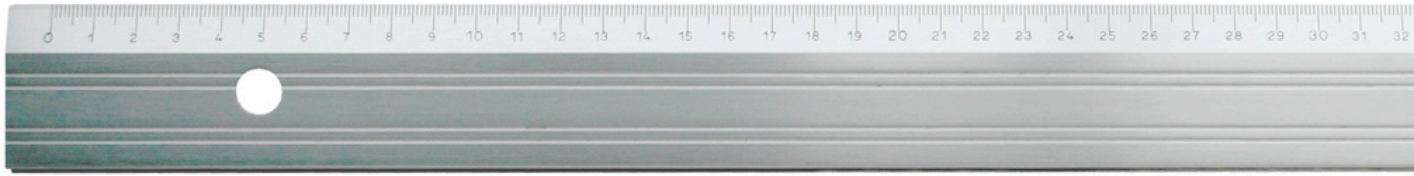
Usually I wait until my Vitamin C tablet stops fizzing before I drink it. Some mornings I am running late for school. How can I speed up this reaction?

Unpacking Reaction rates Inquiry

- Consider the conceptual ideas being developed
- What choices can students make in this inquiry?
- How might you encourage students to compare how effective their methods were compared to others?
- Which questions or ways of collecting evidence of learning might you use in these activities?

Speed Inquiry

- Devise an investigation to find out how long it takes to walk 5 metres
- How confident are you that you selected an effective method?
- How confident are you in your results? Can you justify them?



Unpacking the Speed Inquiry

- Consider the conceptual ideas being developed
- What choices can the students make in this inquiry?
- How might you encourage students to compare how effective their methods were compared to others?
- Which questions or ways of collecting evidence of learning might you use in these activities?

Unpacking the Inquiry Activities

1. How is an inquiry-based approach different to the traditional way these topics are taught?
2. Which inquiry skills could be focused on in each activity?
3. What probing questions might you ask during each of these inquiries?
4. What evidence of learning would you gather for each of these inquiry skills?
5. Would you gather evidence on individual pupils or as a group? Why?
6. What feedback might you give to students in each of these activities?

Using Probing Questions

- There is a fine line between asking questions that probe student understanding and asking those that direct the students along a particular pathway
- In the inquiry activities you have tried today, which questions might have been useful in probing understanding without leading the students?

Inquiry Cycle

Experience and explore the world around them.

Ask questions based on the exploration.

Consider how you could find out the answer to your question.

Collect evidence to answer the question and consider how good it is.

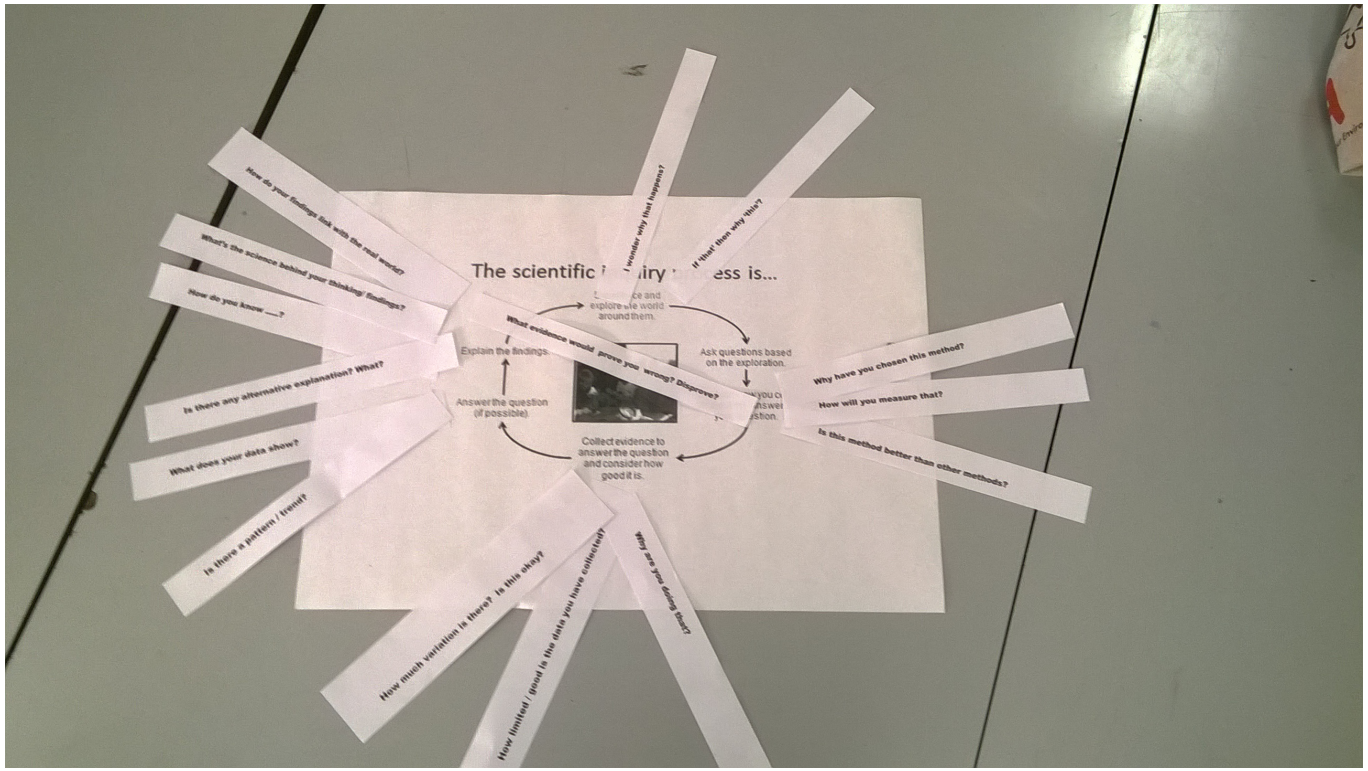
Answer the question (if possible).

Explain the findings.

Using questions to assess inquiry skills

- Discuss the questions on Resource sheet 2.1 Inquiry Questions
- Decide which are the appropriate questions to use to probe student understanding
- On Resource sheet 2.2, Inquiry Cycle, place the questions at appropriate points in the the inquiry process
- Can you add any further questions that you might use in an inquiry?

Questions During the Inquiry



Using Placemats to Collect Evidence

- Look at Resource sheet 2.3
- Placemats are a means of collecting individual ideas within a group to promote discussion
- Placemats provide evidence of individual and group thinking
- Observing groups, while using placemats, provides the teacher with data on the dynamics of the group

Interpreting Evidence of Learning

Look at the completed placemat on Resource Sheet 2.6

- What evidence of learning could a teacher recognise from the completed placemat?
- What feedback/question might the teacher use in response to this information?

Planning your next steps

- How has your thinking about inquiry changed during the session today?
- Which activities from today will you try?
- Which inquiry skills will you be focusing on?
- How will you gather evidence of student learning to inform your assessment judgments and feedback?
- How might you adapt your existing activities and lessons to include more inquiry based aspects?

References

- Harrison C. & Howard, S (2009) *Inside the Primary Black Box*. GL Assessment:London
- Rocard, M., Csermely, P., Jorde, D., Lenzen, D., Walberg-Henriksson, H., & Hemmo, V. (2007). *Science Now: A Renewed Pedagogy for the Future of Europe.* Brussels: European Commission.