Practical Activity Analysis Inventory (PAAI)

A tool for describing the learning objective(s), and key aspects of the design and presentation, of a school science practical activity

Coding form for one practical activity

Robin Millar
University of York

Title:	

1 Learning objective(s) (or intended learning outcome(s))

Objective (in general terms)	*Tick ✓ one box to indicate the **main objective***	**Learning objective (more specifically)**	*Tick ✓ **one** box*
A: By doing this activity, students should develop their knowledge and understanding of the natural world		Students can recall an observable feature of an object, or material, or event	
		Students can recall a 'pattern' in observations (e.g. a similarity, difference, trend, relationship)	
		Students have a better understanding of a scientific idea, or concept, or explanation, or model, or theory	
B: By doing this activity, students should learn how to use a piece of laboratory equipment or follow a standard practical procedure		Students can use a piece of equipment, or follow a practical procedure, that they have not previously met	
		Students are better at using a piece of equipment, or following a practical procedure, that they have previously met	
C: By doing this activity, students should develop their understanding of the scientific approach to enquiry		Students have a better *general understanding* of scientific enquiry	
		Students have a better *understanding of some specific aspects* of scientific enquiry	

If you have ticked this box, please complete the table below

***Specific aspects* of scientific enquiry**	*Tick ✓ <u>all</u> that apply*
How to identify a good investigation question	
How to plan a strategy for collecting data to address a question	
How to choose equipment for an investigation	
How to present data clearly	
How to analyse data to reveal or display patterns	
How to draw and present conclusions based on evidence	
How to assess how confident you can be that a conclusion is correct	

2 Design

2.1 Openness/closure (Tick ✓ one box)	
Question given, and detailed instructions on procedure	
Question given, and outline guidance on procedure; some choices left to students	
Question given, but students choose how to proceed	
Students decide the question and how to proceed	
2.2 Logical structure of the activity (Tick ✓ one box)	
Collect data on a situation, then think about how it might be summarised or explained	
Use your current ideas to generate a question or prediction; collect data to explore or test	
Other. Please describe:	
2.3 Importance of scientific ideas (to carry out the activity well) (Rate: 4= essential; 3=fairly; 2=not very; 1=unimportant)	
Importance of an understanding of scientific ideas	
2.4 What students have to do with objects and materials (Tick ✓ all that apply)	
Use an observing or measuring instrument	
Follow a standard practical procedure	
Present or display an object or material	
Make an object	
Make a sample of a material or substance	
Make an event happen (produce a phenomenon)	
Observe an aspect or property of an object, material, or event	
Measure a quantity	
2.5 What students have to 'do' with ideas (Tick ✓ all that apply)	
Report observations using scientific terminology	
Identify a similarity or difference (between objects, or materials, or events)	
Explore the effect on an outcome of a specific change (e.g. of using a different object, or material, or procedure)	
Explore how an outcome variable changes with time	
Explore how an outcome variable changes when the value of a continuous independent variable changes	
Explore how an outcome variable changes when each of two (or more) independent variables changes	
Design a measurement or observation procedure	
Obtain a value of a derived quantity (i.e. one that cannot be directly measured)	
Make and/or test a prediction	
Decide if a given explanation applies to the particular situation observed	
Decide which of two (or more) given explanations best fits the data	
Suggest a possible explanation for data	

3 Presentation

3.1 How is the purpose, or rationale, communicated to students? (Tick ✓ one box)	
Activity is proposed by teacher; no explicit links made to previous work	
Purpose of activity explained by teacher, and explicitly linked to preceding work	
Teacher uses class discussion to help students see how the activity can help answer a question of interest	
Purpose of activity readily apparent to the students; clearly follows from previous work	
Activity is proposed and specified by the students, following discussion	
3.2 How is the activity explained to students? (Tick ✓ all that apply**)**	
Orally by the teacher	
Written instructions on OHP or data projector	
Worksheet	
(All or part of) procedure demonstrated by teacher beforehand	
3.3 Whole class discussion before the practical activity begins? (Tick ✓ all that apply)	
None	
About equipment and procedures to be used	
About ideas, concepts, theories, and models that are relevant to the activity	
About aspects of scientific enquiry that relate to the activity	
3.4 Whole class discussion following the practical activity? (Tick ✓ all that apply)	
None	
About confirming 'what we have seen'	
Centred around a demonstration in which the teacher repeats the practical activity	
About how to explain observations, and to develop conceptual ideas that relate to the task	
About aspects of investigation design, quality of data, confidence in conclusions, etc.	
3.5 Students' record of the activity (Tick ✓ one box)	
None	
Notes, as the student wishes	
A completed worksheet	
Written report with a given structure and format	
Written report in a format chosen by the student	

4 Learning demand

In the light of your entries above, how would you judge the **learning demand** of this activity? (Rate: 5=very high; 4=fairly high; 3=moderate; 2=fairly low; 1=very low)	
Learning demand	

5 Assessment of effectiveness when used

A Effectiveness at level (1)

Key question: Did students do what they were intended to do, and see what they were intended to see?

		Mainly yes	Mainly no	Not applicable
1	Did students know how to use the equipment involved?			
2	Were students able to set up the apparatus, and handle the materials involved, correctly and safely?			
3	Were students able to use the apparatus with sufficient precision to make the necessary observations or measurements?			
4	Were students able to carry out any routine procedures involved?			
5	Were students able to follow any oral or written instructions given?			
6	Did students observe the outcome(s) or effect(s) you wanted them to see?			
7	Could students explain the purpose of the activity if asked? (what they were doing it for)			
8	Did students talk about the activity using the scientific terms and ideas you would have wished them to use?			

B Effectiveness at level (2)

Key question: Did students learn what they were intended to learn?

		Most	Some	Only a few
1	How many students could recall what they did, and the main features of what they observed?			
Summarise the evidence for your answer above:				
		Most	Some	Only a few
2	How many students have a better understanding of the ideas the activity was intended to help them understand?			
Summarise the evidence for your answer above:				