Formative assessment of inquiry skills

Example 1: Progression in scientific inquiry in the planning of an investigation.
(taken from SAILS Report on the assessment frameworks and instruments for IBSE skills- part B (p.12)).

Task	Level of execution					
	1	2	3	4	5	6
Planning investigation of conducting properties of different materials	Student can't list things made of different materials for measurement and can't write down a plan of experiment.	Student can list 2-3 things made of different materials for measurement but can't write down a plan of experiment.	Student can list 4-5 things made of different materials for measurement and writes down an incorrect plan of experiment.	Student can list 4-5 things made of different materials for measurement and writes down an almost correct plan of experiment.	Student can list 6-7 things made of different materials for measurement and writes down almost a correct plan of experiment.	Student can list more than 7 things made of different materials for measurement and writes down a correct plan of experiment

Example 2: Progression in 'setting up a model' – a skill in mathematical modelling as an inquiry activity.
(taken from the LEMA project materials in assessment at http://www.lema-project.org/web.lemaproject/web/dvd_2009/english/assessment.html)

	Setting up a model
1	Students require support to simplify the situation
2	Students can find and use some necessary information to simplify parts of a complex situation
3	Students can use a range of information to simplify a situation
4	Students make good decisions to simplify a complex situation

Example 3: Progression grid in inquiry skills of Strategic Planning and Monitoring work.
(taken from work of the Lessons for Mathematical Problem Solving Project (www.lemaps.org) in the UK).

	Strategic planning	Monitoring work
Little progress	Attempts to work towards a solution by carrying out operations with figures but shows little strategic awareness that will lead to a solution.	- Carries out own calculations without stopping to reflect or think about what is being achieved. - Does not stop to consider alternative approaches.
Questions for progression	Can you write down an action plan as to how you are going to complete the task effectively? What are the other pieces of information you need to consider?	- When you have finished this calculation what will you do next? - What will your answer tell you? - How could you organise your work?
Some progress	Carries out appropriate and correct calculations but does not take constraints into account.	- Briefly considers alternative approaches by comparing own method with others, but this has little or no impact on own approach. Continues to pursue an inefficient line of reasoning.
Questions for progression	Are there other pieces of information that you have not thought about?	- Look carefully at your partner's work/this piece of work that I have supplied. - What ideas does it contain that could help your own work?
Substantial progress	Works towards a solution, logically reaching a viable solution.	- Stops occasionally and considers the work of others carefully. Compares this with own approach and tries to make use of the approach. - Finds it difficult to discriminate efficient/inefficient approaches to the problem, however.
Questions for progression	Can you think of an alternative approach to solving this problem? What would be the effect on the outcome?	- Which of these two ideas is more powerful? - Why is this? - Which of these approaches could still work if we changed the numbers in the problem?
Task accomplished	Arrives at a solution having considered alternatives.	- Engages thoughtfully with the work of others. Selects and uses powerful approaches.