What works

Real-world problems and engagement with the topic (29 total comments)
- Students are engaged with the activity and interested in the topic (10)
- Their research has a real-life application that is relevant to them now or in the near-future (9)
- It is directly connected to the environment/community around the school or to another context that the students see as important (4)
- Students have a choice of activity and investigation (4)
- Student-centred learning takes place (1 statement)
- The students want to come in at lunch and after school and work on their project (1)

Planning and structure (28 total comments)
- When the EEI is well-planned, by the teacher and/or the students (7)
- The activity is scaffolded and structured, with criteria that are clear and easy to follow (7)
- The activity is simple and straightforward (4)
- The activity can be done properly in the available time (3)
- The activity can be extended in a range of ways and/or has an open-ended element to it. This is especially important for more able students (3)
- There are clear goals, and the students have a plan ready (2)
- The activity has been tested previously (1)
- The instructions are clear and the students can follow them to achieve success (1)

Scientific process (23 total statements)
- The investigation is well structured and controlled for variables so that the students can get useful, valid data (5)
- Students plan methods, identify variables, discuss what they want to do in detail, and research the biological concepts that underlie the EEI before they start (4)
- The project has a limited number of variables and provides quantitative data (3)
- Real-life data, more than two variables, analysis (2)
- There is enough lead-time for the students to really think about all aspects of the task, and to refine and modify their investigation – it takes a whole term to do it well (2)
- The question is so open, and students have been trained in that process (1)
- The results show reliable data where interrelationships can be shown (1)
- A highly specific question or limited area is investigated (1)
- Students learn to problem solve and research novel topics – very nerve-wracking for the teacher but also very exciting – 6 weeks is ideal (1)
- The students have considered all possible outcomes of the inquiry (1)
- The scientific concepts are simple enough for the students to understand, discuss, and manipulate (1)
- There is enough flexibility for students to design their own question and method (1)

Resourcing and skills (13 total comments)
- The activity is well-resourced (including time for planning) and it is easy to get the needed items and equipment (8)
- The class is small (2)
- There are no limitations on space and resources (1)
- The students already have the necessary skills (1)
- It is in an area of the teacher’s expertise (1)
What doesn’t work

‘Students fail it!’

Real-world problems and engagement with the topic (12 total comments)
- Insufficient time and lack of motivation
- Real life applications not relevant to students (3)
- Students can’t see the reasons why we should investigate these problems
- If they have no interest in the topic (2)
- Students design an experiment that has little/poor real world relevance
- Students aren’t engaged and don’t plan or challenge themselves
- It doesn’t have the ability for extension and more complex testing and developments
- It is too scaffolded, students are not given freedom to explore their interest
- Students want you to tell them what to do without any research or input

Planning and structure (17 total comments)
- Downloaded experiments from the internet (2)
- Students don’t plan their time well (3)
- Students are poorly organized & insufficient time is allowed (5)
- Lack of planning prevents them achieving their results
- Experiment lacks content
- Students start of with a methodology ‘I want to do’ rather than a research question
- It has too many parts
- Criteria/aim of EEI is unclear to students
- Students rush in and do not undertake adequate background research ie not a valid research question posed or explored
- Students not clearly guided
- Students do not take advice & work independently

Resourcing (7 total comments)
- It is too rushed and not enough time to complete
- Experiments are not necessarily in time with school periods ie Time
- Class is too big to manage, students are given free reign and you fail to ‘rope them in’
- Lack of resources or the concepts are too difficult
- Lack of equipment to really extend the student research skills
- Resources, space, time
- Stages are not monitored (students fall behind)

Scientific process (17 total comments)
- Too many variables (2)
- Results are not quantitative (3)
- It is not clearly defined
- Too abstract and research questions are not well formulated
- Students fail to collect data due to equipment/procedure for example, poor endpoints in water hardness titrations. However, even when an experiment fails, students can still analyse/evaluate etc and is still effective
- Students finding it difficult to test with a fair test controlling all variables
- When student hasn’t formed a proper hypothesis (sometimes based on 2º data)
- Students haven’t got a clue what they are trying to test and achieve.
• Too vague, data isn’t simple enough for analysis
• Pushed for time, lack of available equipment or teacher content knowledge
• Students run out of time for investigating phase or aren’t sure of the process to follow
• Not sufficient time allocated
• Issues with experiment preclude data collection
• Question too open, too general, encompasses more than one question

Skills (10 total comments)
• A student doesn't have the basic skills of experimental design and data processing/analysis (2)
• Task set at too high a standard ie sometimes we ask students to think and act at a level too high for their ability
• Too complex, the kids can’t get their head around it and get started
• Students don’t understand their own investigation
• In too large groups and lack of knowledge on the topic chosen
• Pupils do not have sufficient knowledge/research skills
• Students do not have sufficient background knowledge, is over ambitious or tries to fit a ‘prac’ to the task
• Students' literature searching skills are too poor to allow them to plan and analyse results
• Poor research skills to come up with a viable hypothesis