# Quick guide to practical science projects

Investigative scientific projects are very much in the spirit of project qualifications, particularly EPQ, with its emphasis on enquiry and analysis.

The flexibility of the project qualifications lend themselves well to investigative projects and there are many centres supporting students through imaginative and well planned studies. Practical experimental investigations in the sciences can be very successful and allow students the opportunity to apply scientific method to their own investigation and develop vital research skills. To centres that are perhaps a little wary of these types of projects we would offer the following suggestions.

**Which format – artefact or research based written report?**

Either is appropriate. An engineering construction project or a set piece demonstration can be designated an artefact. Video or photographic evidence could be submitted as evidence to the external moderator. The accompanying written report would contain the secondary research required to support the artefact, and the decision making implemented together with an evaluation of its success.

Most science topics where a hypothesis is to be tested would be better as a research based written report in the style of a scientific paper, with a literature review containing the secondary research findings at the beginning followed by the methodology, data and analysis. Statistical validation of results would be appropriate to many investigations.

All project products must include a written report. The exact length of each written report will depend on the nature of the project, the subject area or topic chosen and the other evidence provided. Please see the relevant specification to determine the length of report require for each level of project qualification.

**What resource implications are there?**

**Inside the school or college**

Clearly the cooperation of subject staff and technicians is a must for experimental work as all safety protocols need to be observed, and laboratory or fieldwork will need a level of supervision and appropriate risk assessments put in place. The student's supervisor does not need to be a science specialist. A staff member who is prepared to be consulted regularly and supervise any practical work can be designated as a technical mentor, leaving the project supervisor in the normal advising and monitoring role. The Production Log can be used to record the input of the technical mentor.

**Outside the school or college**

University departments, work experience placements and field study centres can be useful resources, particularly where specialist technologies are required. Provided the planning stages of the project are completed before a placement there is no reason why such resources cannot be used to gather the experimental evidence needed.

Nuffield placements provide an excellent opportunity for a student to use advanced facilities. However it is important that both supervisor and student understand that a placement project undertaken independently cannot retrospectively be turned into an extended project.

The Production Log should show the initial planning and record the arrangement of the placement and the precise support or facilities to be used to implement the plan. A fully completed log with all sections correctly dated will provide evidence that the project requirements for planning have been met.

The role of technical or research staff in the placement needs to be clearly described so that the independent work of the student is clearly delineated.

**Who else might be involved?**

Individual experts can be approached for advice or mentoring where appropriate, provided the Production Log acknowledges this. This is no different from any other project topic where experts such as healthcare professionals, university lecturers or subject specialist school teachers are interviewed or their advice sought.

Centres encouraging their students to plan experimental projects can get further advice from their project adviser.

**Further useful resources include:**

The institute for research in schools (IRIS) provides EPQ guidance and exemplar projects: http://www.researchinschools.org/HowTo/EPQ.html

The Wellcome Trust has produced a very useful guide to research ethics for EPQ students: https://wellcome.ac.uk/sites/default/files/wtp057673_0.pdf

In addition The Wellcome Trust has produced a practical guide to extended science projects https://bigpictureeducation.com/sites/default/files/PE-6145%20EPQ%20Magazine.pdf

The Institute of Physics has guidance on "Supporting the level 3 Extended Project in Physics" and provides resources and casestudies of physics EPQs http://www.iop.org/education/teacher/resources/extended_project/page_62232.html

The National Stem Centre provides resources to support STEM subject EPQs including eithcs guides for students and teachers https://www.stem.org.uk/resources/elibrary/resource/420662/go-further-practical-guide-extended-science-projects

The Nuffield Foundation provides guidance on health and safety in school and college science laboratories http://www.nuffieldfoundation.org/standard-health-safety-guidance

Science and Plants in Schools provide resources to support developing skills for science and social science EPQs:

http://www.saps.org.uk/secondary/teaching-resources/1346-developing-skills-for-the-extended-project-qualification

Into Biology provide research ideas for EPQ and resources that support biology and biochemistry EPQs:

http://intobiology.org.uk/category/student-projects/