

Unit title: **Work-based Investigation**

Unit code: **R/601/0223**

QCF level: **4**

Credit value: **15**

Aim

This unit enables learners to gain credit for work-based practical investigations either as an individual or as part of a team. Learners will plan, undertake, monitor progress and communicate the outcomes of a work-based topic.

Unit abstract

Scientific work-based experience is an important aspect of all practical subjects. For part-time learners their day-to-day activities are a valuable source of learning and should be recognised. Company-based investigations often involve a team working on a common project with each individual carrying out a specific role and contributing key information to the final outcome. It is essential therefore that investigators are able to work safely and accurately, keeping detailed records of their activities and clearly communicating their findings.

This unit allows flexibility in terms of subject content and timescale. The investigation must be carried out in the workplace and the assignment set in an industrial context. The unit is intended for part-time learners in their place of work. This unit develops the skills of negotiation, planning, record keeping, safe practical investigation, report writing and communication.

This unit differs from *Unit J/601/0221: Project for Applied Science* as it must be carried out in the workplace and gives credit for work-based activity. The work used for this unit must not be used for either *Unit J/601/0221: Project for Applied Science* or *Unit D/601/0998: Work-based Experience*.

Learning outcomes

On successful completion of this unit a learner will:

- 1 Be able to plan a work-based topic
- 2 Be able to keep a detailed logbook
- 3 Be able to undertake an extended work-based practical investigation
- 4 Be able to communicate the investigation and its results.

Unit content

1 Be able to plan a work-based topic

Work-based topic: type e.g. team, individual; subject area related to HN curriculum

Specification: practical and literature based; scope and purpose of investigation; intended outcomes; methods of approach; resource requirements

Resources: existing equipment and materials; access to other equipment

Amend schedule: following discussions with supervisors e.g. agreed amendments to specification, timescales

Supervisors: work-based supervisor; academic supervisor

2 Be able to keep a detailed logbook

Document work: dated entries; details of methods used; instrument types and settings; observations; safety measures taken; advice sought; cooperative and own results; tabulated results according to scientific protocols regarding headings, units and significant figures

Amend the schedule: significant or unexpected events; deviations from expected data and results; progress made relative to original plan; agreed amendments with supervisor

3 Be able to undertake an extended work-based practical investigation

Investigation: experimental work; operating methods and procedures; acquisition of equipment and materials; methods of data collection and recording; accuracy and precision; quality standards; minimise errors; use statistical techniques

Safe practice: safety manuals; safety equipment; COSHH analysis; risk assessments

Autonomy: amendments to schedule; practical work; contributions to group work; discussions with supervisors; proposals for additional work

Agreed plans: documented arrangements for group work; agreed deadlines

4 Be able to communicate the investigation and its results

Conclusions: analysis of data and experimental observations; justification in terms of original specification

Scientific report: abstract; introduction and objectives; literature review; results in their fully processed form; raw data, spectra etc included as an appendix; experimental work; discussion; areas of further investigation; appendices; bibliography

Formats: in-text referencing and bibliography according to accepted scientific methodology; third person past tense; tabulated results

Specification: practical and literature based; scope and purpose of investigation; intended outcomes; methods of approach; resource requirements

Presentation: appropriate media; style appropriate to audience; clear explanations of scope and results; justify conclusions

Learning outcomes and assessment criteria

Learning outcomes On successful completion of this unit a learner will:	Assessment criteria for pass The learner can:
LO1 Be able to plan a work-based topic	1.1 propose a work-based topic that relates to the programme of study 1.2 produce an outline specification for the topic 1.3 list required resources and support procedures 1.4 amend the schedule as appropriate following consultations with supervisors
LO2 Be able to keep a detailed logbook	2.1 document work undertaken in a systematic manner 2.2 amend the schedule as appropriate 2.3 distinguish between own results and group results
LO3 Be able to undertake an extended work-based practical investigation	3.1 undertake the investigation, working accurately and following safe practice protocols 3.2 demonstrate substantial and appropriate degrees of autonomy 3.3 execute shared work according to agreed plans
LO4 Be able to communicate the investigation and its results	4.1 justify conclusions drawn from the results of the investigation 4.2 produce a scientific report of the investigation using accepted formats suitable for use by an industrial line manager 4.3 explain the extent to which the specification has been met 4.4 deliver a presentation summarising the investigation

Guidance

Links

This unit has particular links with the following units within this qualification:

- *Unit reference number F/601/0220: Analysis of Scientific Data and Information*
- *Unit reference number L/601/0222: Laboratory Management*

This unit also links with the following NOS:

- *NVQ L4 Laboratory and Associated Technical Activities (LATA).*

Essential requirements

Delivery

This unit differs from *Unit J/601/0221: Project for Applied Science* in that it must be carried out in the workplace and gives credit for work-based activity. The work used for this unit must not be used for either *Unit D/601/0998: Work-based Experience* or *Unit J/601/0221: Project for Applied Science*. This *Work-based Investigation* unit places greater emphasis on record keeping, negotiating skills and autonomy.

This unit must be delivered in the context of a science-based industry or service, for example the pharmaceutical industry, health sciences. Learners must carry out technical work that would be undertaken by a person employed in the science field.

For learning outcome 1, learners must demonstrate that they can plan a work-based project in cooperation with their supervisors. All learners require a named and suitably qualified industrial supervisor as well as an academic supervisor. The planning stage is crucial and should be carried out jointly by the learner and both supervisors. Supervisors should agree protocols jointly for monitoring learner performance and independence of effort. The chosen topic may be part of a team investigation but sufficient documentation must be kept to clearly demonstrate the individual work of each learner.

For learning outcome 2, learners must keep a dated, day-to-day logbook listing details of all work undertaken and results obtained. Logbook entries should be completed either during or immediately after each session spent on the topic. The logbook must distinguish clearly between team member results and observations and those undertaken by the individual learner. It should also record details of meetings and discussions with supervisors.

For learning outcome 3 it is envisaged that the industrial supervisor will be mainly responsible for overseeing the project and ensuring that it is carried out safely. The industrial supervisor should have regular meetings with the learner during the experimental period to guide and, where appropriate, comment on the direction of the project. They will also be responsible for ensuring that the learner carries out substantial independent activity.

For learning outcome 4, learners must produce a scientific report and deliver a presentation (preferably PowerPoint) summarising the investigation and its results. The report should be produced in accordance with industrial reporting protocols. Clear guidelines for the style and content of the industrial report should be agreed and documented, but in all cases reports must be produced using a recognised scientific format. Suggestions for further work should relate to minimising errors, extending the topic area, confirming or supporting conclusions etc.

Assessment

Evidence for achieving this unit must be in a scientific context. The work used for this unit may be part of the learner's normal workload or an activity designed specifically to deliver the required evidence, or a combination of the two. In either case, the negotiation and planning required for learning outcome 1 must be completed and agreed before detailed practical work begins. The process of the work and its recording for learning outcomes 2 and 3 should follow normal site practices as closely as possible.

The format of the final report for learning outcome 4 should be determined at the planning stage. Scientific terminology and protocols should be used where appropriate. Supervisors must set a deadline to see a draft version of the early sections (not the whole report), and provide feedback on these. Amendment and completion of the final report should then take place without further assistance or comment from either supervisor. The presentation should be made to supervisors and fellow learners and may or may not include peer assessment. Input from fellow employees is encouraged. If the presentation is to be used as evidence for higher grading criteria then minimum guidance should be given.

Resources

The work for this unit will normally be achievable within the resource constraints of the employer. Additional use of resources at the centre may be appropriate in specific cases. For example laboratory facilities or resources to develop the report and/or presentation.

Employer engagement and vocational contexts

Work for this unit should be carried out in the workplace under the direct supervision of the works supervisor, in consultation with the academic supervisor.