Skills for Work

Qualification Verification Summary Report 2024–25

Laboratory Science

Verification group number: 487

Skills for Work Courses

Skills for Work: Laboratory Science National 5

HN9X 75 Careers Using Laboratory Science
HT8X 75 Careers Using Laboratory Science — Scotland
HN9W 75 Working in a Laboratory
J2W3 75 Practical Skills
J2W4 75 Practical Investigation

General comments

In academic session 2024–25, all centres were verified by visits.

All centres visited in session 2024–25 had a good understanding of the requirements of the course and units. Many centres had contacted other experienced centres prior to undertaking the course for the first time to share resources and good practice.

The course is a National 5 course and the recommended entry for candidates is that they should have attained, or be studying, a science subject and Mathematics at National 4 or 5.

Course arrangements, unit specifications, instruments of assessment and exemplification materials

Assessors and internal verifiers in most centres were familiar with the course as well as the individual unit specifications.

The SQA assessment materials were used by all centres with appropriate changes to enhance the candidate experience. The SQA assessment support packs (ASPs) for the units were also used, again with appropriate changes and additions to support learning and individual centre assessment strategies.

Centres ensured that any materials devised or amended did not deviate from the required assessment of outcomes for all units. Where centres had omitted materials to avoid repetition for candidates, this was deemed appropriate by external verifiers, providing that the changes did not deviate from course and unit specifications and that they were documented and agreed internally.

Centres should note that this course does not currently require prior approval by SQA, but it is the centre’s responsibility to ensure that the department running the course is equipped sufficiently with resources and equipment needed to deliver the course.

Evidence requirements

The evidence submitted during verification showed a clear understanding of the requirements by all centres.

The course is a Skills for Work Course. Centres must ensure that employability skills and self-analysis are the focus at appropriate points in the course. Most centres were able to offer workplace visits or organise visits from external speakers from related industries to the centre. The SQA support materials give examples of responses for candidate reviews of employability skills. Progression in these skills must be evident for each candidate in their folio as they progress through the course.

Centres must ensure that all candidate evidence is available when recording a pass for an outcome or complete unit. This required evidence is outlined in the relevant unit ASPs available through centre SQA co-ordinators.

Centres must ensure that all assessment materials and evidence for each candidate is made available for verification.

All evidence must follow SQA guidelines as prescribed in the Laboratory Science Course Specification National 5, which can be found on SQA's website, along with the ASPs, which can be found on the secure site.

Administration of assessments

Assessment evidence submitted by centres for verification was generally well presented, organised and easily accessible for external verification of each candidate.

Most centres assessed the units of the course to the appropriate standard and were able to justify candidate assessment judgements for each outcome or unit as appropriate.

For candidates who did not meet the required standard, centres gave an appropriate number of opportunities for re-assessment. The maximum number of re-assessment opportunities was documented and agreed by assessors and internal verifiers. Evidence for re-assessment for any candidate was made available for external verification. Additional information that candidates gave verbally was noted by centre staff along with the dates and centre staff initials.

Many centres were in the process of completing the Practical Investigation unit at the point of external verification but could show that plans were in place to complete the teaching and assessment of this unit. This unit should be the final unit undertaken by candidates as it allows the scientific skills gained in the other units to be used in a practical scientific situation.

Throughout all units, there were clear examples of choices given to candidates for practical work and practical investigations. This was clearly evidenced by the variety of investigations undertaken by candidates.

Learning and teaching

In most centres, learning and teaching was of a high standard, with many centres using similar strategies as used in the discrete sciences at National 5.

Science technicians were involved in the delivery of Skills for Work Laboratory Science. In some centres, they assisted with practical work in the direct teaching of several of the outcomes.

Many centres have links with the Developing the Young Workforce (DYW) coordinator within the local authority or their own centre. This has allowed them to provide trips for candidates to local industries as well as organise visits from guest speakers to the centre.

Overall assessment

The overall assessment of the course was of a high standard and followed SQA ASPs. Some centres had devised their own internal assessment tests at appropriate points in the course.

Verification

Appropriate internal verification was evident and documented by all centres. Most centres also had internal verification plans or policies and documented evidence to show discussion of internal verification issues arising during the course. Where candidates did not meet the standard required for an outcome within a unit, centres made it very clear to both candidates and external verifiers why they did not meet the standard. Appropriate remediation was offered before candidates could attempt the outcome again.

Centres which produced evidence of strong and robust internal verification had used the SQA internal verification toolkit.

In many centres, internal verification was carried out through both in-class observations by subject specialists and through photographic evidence which was included in the verification material.

Most centres signed and dated verification of laboratory work carried out at the time of assessments. The verifier initialled and dated the practical they assessed.

Areas of good practice reported during session 2024–25

Centre judgements were reliable in terms of individual outcomes for each candidate, whether the outcomes had been achieved or not achieved. When a candidate required further assessment opportunities, centres presented all assessment evidence to external verifiers, clearly indicating which outcome evidence was achieved.

Candidate assessment folders were organised in a way that made it easy for external verifiers to verify candidate evidence.

One centre used a wall planner to keep track of outcomes passed for all candidates, making assessment and verification planning easier. Most centres used Microsoft Excel for tracking and recording candidate progress.

Careers Using Laboratory Science

Many centres combined outcomes 1 and 2 in this unit to avoid duplication for candidates. Centres clearly indicated where outcomes in this unit had been achieved by candidates as part of their presentation.

In all centres, candidates completed a CV, which incorporated some of the skills undertaken in the course. Most CVs were detailed and aimed towards employment in the laboratory science sector. Candidates' evaluation of their skills was detailed, and assessors provided extensive feedback.

A visit to a scientific industrial site is not mandatory for the course. However, many centres used this activity to enhance the candidate experience. It allowed them to see science skills in action in the workplace and talk to working scientists about their career paths. Some centres organised visits from STEM ambassadors to the centre for the same purpose. Some centres also have extensive links with local further education (FE) colleges and/or universities, and many of the practical assessments in the course were conducted at the FE college or university.

Most centres ensured that the three self-evaluations required in this unit were suitably spread out throughout the course. The self-evaluations were discussed with candidates, and progress in each skill area was evident and documented.

Many centres liaised with employability principal teachers and careers officers to enhance the overall course, setting up mock interviews and application forms for employment and visits from external science-based employers.

Centres ensured that a variety in choice of scientific industry and presentation method was available for candidates while still covering the required outcomes. This meant very little duplication between candidates, which was evident from the various videos, posters and PowerPoint presentations, and many other innovative presentation methods.

Working in a Laboratory

As the course covers a wide range of scientific laboratory work, it may be unlikely that the staff member timetabled has experience in all areas. It is good practice to involve specific members of staff for advice and even to assess and/or teach areas that the timetabled staff may find difficult. An example of this would be physics staff demonstrating the safe handling of radioactive sources. The same arrangements can be used for the Chemistry and Biology aspects of the course.

In some centres, the internal verification of some practical outcomes was carried out by a verifier who specialised in that area.

There was calculation evidence throughout the course, rather than just in the Working in a Laboratory unit, and particularly in processing of results in the Practical Investigation unit. It was evident that centres were aware of the standards required for calculations, as the calculations were of the standard required in National 5 discrete science exams.

Some centres introduced and worked through a further unit to develop the numeracy skills required for the course. Some centres used existing problem sheets from the discrete sciences to enhance this area before allowing the candidates to perform the calculation as part of practical work for evidence purposes.

Some centres also used existing problem sheets from discrete sciences to enhance the four types of calculation required in outcome 3. This gave candidates practice in the calculation type before assessment.

Some centres added value to the Working in a Laboratory unit with involvement from their science technicians. They demonstrated and supervised candidates in portable appliance testing (PAT) on electrical equipment in the centre. They allowed candidates to conduct their own PAT tests on appropriate equipment. The technicians were also involved in the demonstration and supervision of the proper method for preparing agar plates.

In most centres, candidates completed risk assessments for several practical activities, demonstrating the assessed skill more than once.

Practical Skills

Many centres used staff members with level 3 Microbiology training to verify outcome 1 in this unit.

In this unit, candidates carried out a wide variety of experiments for outcome 4, including titration and chromatography. Many centres included more than the minimum requirement.

Some centres used photographs as further evidence for some of their experiments, including chemical spills and microscope samples. This type of evidence is recommended for this unit for external verification.

The raw data for chromatography in outcome 3 was made available to allow the assessment to be verified. Photographic evidence of all techniques was available at verification, along with detailed diagrams of the candidate’s microbiology plates.

Practical Investigation

There were many examples observed of good planning for the practical investigation, including clear, well-laid-out plans showing evaluation of hypothesis and methods.

Candidates carried out different practical experiments and the SQA marking instructions in the ASP were used. Written comments were used to justify decisions, allowing agreement between the external verifier and assessor.

In some centres, candidates carried out a practice investigation together to ensure understanding of how to plan, carry out and write up their own investigation independently.

Centre staff planned the investigation rigorously to enable each candidate to perform an individual investigation but to plan and evaluate it as part of a team.

Centres avoided duplication of work. For example, if a candidate performed titrations as part of their investigation and if they had shown all their volumes (initial, final and used) with units, then this was seen as sufficient evidence for outcome 4 in the Practical Skills unit. This was well documented by centre assessors and verifiers and was clearly evident during external verification.

The evidence showed that the individual requirements for the investigation were well met by most centres, including the headings, units, labels, scales and plotting.

Where possible, centres also gave candidates a choice of investigation topic for this unit. Candidates were encouraged to choose a topic which they had not covered in their scientific experience to date.

In some centres, all candidates completed a thorough risk assessment, which was included with their report, showing good understanding of earlier units. They also completed an investigation plan on a separate sheet and carried out trial investigation before making a final decision on the variable they were going to change.

Specific areas for improvement reported during session 2024–25

Internal verification

Centres should ensure that internal verification takes place within a suitable time frame after assessment. This ensures that candidates are given documented feedback as quickly as possible, and that they are given the best opportunity to pass an outcome on the next attempt after appropriate remediation. The timing of internal verification for individual outcomes is a centre decision but should take place as soon as possible after assessment for this course, as the course is fully internally assessed.

A range of assessment methods should be included in the verification sample. The number of candidates sampled should be proportionate to the total number of candidate entries for that qualification in a centre, including any candidates at alternative or satellite sites. However, a higher level of sampling would be expected if a centre is undertaking this qualification for the first time, to reduce any quality assurance risks.

Where visual verification of candidates' practical work has taken place, centres should make this clear for external verifiers. This can be best established by inclusion in the centre's verification policy for this course. The verification policy should be short and concise but agreed by assessors and internal verifiers.

When centres produce their own class records for external verification, they should ensure that these records match closely with the exemplar records produced in the SQA materials.

Pass and fail decisions on the record sheet must match the evidence available. Some centres had pass outcomes for candidates, but there was no or incomplete evidence that the candidate had performed the minimum requirement.

One centre re-arranged the course and delivered it using Biology, Chemistry, Electricity and Radiation groupings. This is acceptable if the correct assessments for each outcome are covered and presented for external verification.

Careers Using Laboratory Science

The Careers Using Laboratory Science unit should be assessed throughout the course to ensure that the first self-evaluation is covered by candidates close to the start of the course, with the second around the middle of the course, and the last towards the end. This will ensure that candidates make progress on the skills analysed in their self-evaluations for the course, including practical skills which are undertaken in other units.

In this unit, candidates should be encouraged to research their own choice of industries. In some centres, repetition was evident. The industries chosen for outcome 1 must match the industries in outcome 2. The industries selected must come from the sectors detailed in the unit specification.

Candidates should provide more details in their candidate reviews, for example how they will work on their goals. Candidates should review their goals in candidate reviews 2 and 3, instead of setting new goals each time. Candidate reviews should be spread throughout the year and candidate review 3 requires feedback from another person. Feedback to candidates must be documented.

Within outcome 4, candidates should add comments to support and/or explain their self-evaluations. The assessor should also complete comments on the candidate reviews throughout the learner conversation.

Candidates should link their CV to one of the laboratory careers they have researched, and they should utilise their evaluations more when writing their CV. The CV must be specifically written to apply for a laboratory science related job opportunity. The CV must link to a science career and not just be a general CV.

Working in a Laboratory

Centres should ensure that candidates present at least one piece of evidence for the completion of each calculation type in the Working in a Laboratory unit. Where this evidence is contained in another unit, this should be made clear for external verification.

Centres should encourage candidates to use an appropriate number of significant figures for the final answers to calculations and ensure the use of appropriate units in final answers. ‘An appropriate number of significant figures’ for final answers is the guidance associated with external exams in science subjects at National 5 level. If candidates do not consider significant figures and units in calculation work, then the evidence presented will be deemed inappropriate. When carrying out the calculations for the Working in a Laboratory unit, the candidates must show the recorded measurements as well as the working for the calculations.

For outcome 1— flammable risk assessment — use of a Bunsen burner is insufficient as a flammable hazard. The risk assessment needs to be more detailed and include minimising the risk of electrical, flammable and chemical hazards.

Centres should ensure that candidates’ assessments are carried out for all three types of hazards listed in the unit specification. In outcome 2, candidates must ensure that the type of container is mentioned for storage. For all chemicals, candidates must record the state and concentration in the risk assessments. Candidates must perform experiments which link to the four compulsory calculations. They must show their working and record the four calculations: ratio, average, percentage and re-arranging the formula accurately. Examples can be found in the ASP.

Candidates must record the chemical state and concentration in outcomes 1, 2 and 3.

Practical Skills

Candidates must create their own tables with headings and units. They must not be provided with a partially completed table, and they must ensure that appropriate units are included in all headings.

For radiation safety, candidates must justify why health and safety are important when working with radioactivity. For outcome 2, candidates are asked to explain the safety precautions. Each safety precaution needs an explanation.

For example:

- Precaution — Use forceps to lift radioactive sources.
- Explanation — Forceps ensure no direct contact between biological tissue and source. They also ensure a greater distance between source and biological tissue. Greater distance — less dose.

Centres must ensure that candidates calculate Rf values for chromatography and ensure that boiling points are recorded for distillation.

Practical Investigation

Candidates should be given a choice of investigation. If all candidates in one centre complete the same topic for the practical investigation, then centres would be expected to justify reasons for this decision.

If candidates struggle with handwritten reports, they should be encouraged to type the report.

Use of technology such as Excel for drawing graphs is acceptable and should be marked according to the marking scheme for the investigation.

The investigations for each candidate must be marked by the assessor and a sample must be verified. The external verifier will ensure that marking has been completed to standard. The investigation is marked out of 20. The centre must ensure that they are using the most up to date ASP for this unit and applying the marking criteria to the investigation write up.

For controlled variables, candidates must give a reason for the control of variables.

Candidates must have repetition of results to obtain the mark for outcome 2d.

Candidates must not be given a template for the final write up of the investigation. Tables with headings or graphs with labels must not be given to candidates. Some centres use a template to aid candidates in the completion of their investigation. This is acceptable; however, candidates must write a final report which reflects the type of report submitted for discrete sciences. This final report is marked by the assessor using the ASPs, and it is required as evidence for verification.

Unit assessment support packs

Centres must ensure that they use the most up to date ASP for each unit and give opportunities for all candidates to achieve each outcome in each unit.