National Qualifications 2022
Qualification Verification Summary Report
Skills for Work: Laboratory Science

Verification group number: 487

The purpose of this report is to provide feedback to centres on verification in National Qualifications in this subject.

Skills for Work Courses

Skills for Work: Laboratory Science (National 5)

H9X 75	Careers Using Laboratory Science
HN9W 75	Working in a Laboratory
J2W3 75	Practical Skills
J2W4 75	Practical Investigation

General comments

A limited number of centres were verified in session 2021–22. Centres were visited remotely.

All centres visited in session 2021–22 had a very good understanding of the requirements of the course and units, and many centres had contacted other, experienced centres, prior to undertaking the course for the purposes of sharing resources and good practice.

Approval visits prior to the delivery of the course are no longer a requirement.

This is a National 5 course and the recommended entry for candidates are that they should have achieved 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 very 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 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 centre-devised materials did not deviate from the required assessment of learning outcomes (for all units). However, where centres could justify omissions from the assessments to avoid repetition for candidates this was deemed appropriate by external verifiers so long as changes were documented and had been agreed internally by centres.

Evidence requirements

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

The course is a skills-for-work course and as such centres should ensure that employability skills and self-analysis should be a focus at appropriate points in the course.

The SQA materials include exemplification of candidate responses in the candidate reviews of these skills. Progression in these skills should be evident for each candidate in their folio.

When centres record a pass for an outcome or complete unit, they must ensure that **all** evidence is available as outlined in the relevant ASP. These should be available to centres through their centre SQA co-ordinator.

In session 2021–22, all centres were given general guidance as well as subject-specific guidance for internally assessed qualifications. The alternative approaches to assessment were developed to provide further flexibility to centres during this session.

A short summary of the subject-specific guidance for Skills for Work: Laboratory Science is given below.

No group work was required.

HN9W 75 — Working in a Laboratory

Observe safe social distancing and follow local authority and SSERC guidance.

J2W3 75 — Practical Skills

Observe safe social distancing and follow local authority and SSERC guidance.

Reduction in skills required:

- Outcome 1: Either one of three bacterial subcultures, or one of four yeast subcultures, wet and dry mounts required
- Outcome 2: Measuring radiation required
- Outcome 3: One of two tasks required
- Outcome 4: One of three techniques required

J2W4 75 — Practical Investigation

Observe safe social distancing and follow local authority and SSEC guidance.

Every attempt should be made to link the practical investigation to a practical skill from J2W3 75 to allow the skill to be assessed concurrently.

Many centres followed this guidance completely, while some chose full course coverage depending on individual centre circumstances. External verifiers were instructed to take the allowed adaptations into account.

Centres must be aware that these modifications remain in place for session 2022–23.

Administration of assessments

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

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

Where candidates did not meet the standard required, centres gave an appropriate number of opportunities for re-assessment. The number of re-assessment opportunities was agreed and documented within centres and evidence for re-assessment was made available for external verification.

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 the standard had not been met and appropriate remediation was offered before candidates could attempt the outcome again. The number of attempts a candidate can take to pass any outcome is at the discretion of the centre, however more than three attempts for any candidate would have to be justified by the centre as a special circumstance.

Appropriate internal verification was evident in all centres. In most centres this had taken place in a formal documented manner, with internal verification plans showing evidence of discussion and decisions made on internal verification.

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

Areas of good practice

Centres' judgements have been found to be reliable in terms of individual outcomes for each candidate, whether the outcomes have been achieved or not achieved. When any outcome has required a re-sit, centres have made it clear for external verification which assessment showed achievement of the outcome and presented both unachieved and achieved assessments as evidence.

Some centres had a variety of candidates with experience ranging from National 4 to Advanced Higher. In such cases centres ensured that all candidates met the minimum requirements for the course outcomes.

Candidate assessment folders were organised in a way that external verifiers could easily verify candidate evidence.

Careers using Laboratory Science

Many centres combined outcomes 1 and 2 in the Careers Using Laboratory Science unit to avoid duplication. Where outcomes in this unit had been overtaken by candidates as part of their presentation, centres clearly indicated where this had occurred.

All centres completed a CV for each candidate, which incorporated some of the skills undertaken in the course. Completed CVs were detailed and aimed towards employment in the laboratory science sector. Candidates' evaluations of their skills were detailed, and assessors provided extensive feedback.

A visit to a scientific industrial site is not mandatory for the course, however many centres use this activity to enhance the candidate experience and allow them to see science skills in action in the workplace and to talk to working scientists about their career paths. Under normal circumstances, centres organise visits from STEM ambassadors to their centre for the same purpose. Some centres also have links with local FE colleges/universities and many of the practical assessments in the course were conducted at the FE colleges/universities. Due to COVID-19 restrictions this was not possible for most centres in this academic session, however some centres were able to organise online discussions with staff from laboratory-based industrial sites.

Centres ensured that the three self-evaluations required in this unit were suitably spread out across the course with the first at the beginning, one in the middle and the last towards the end. The self-evaluations were discussed with candidates and progress in each skill area was evident.

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

Personalisation and choice opportunities for candidates were evident. Centres ensured a wide range of scientific industries were chosen so there was very little duplication between candidates.

Candidate choice of presentation included video, poster and PowerPoint, and many other innovative presentation methods. Centres ensured that for whichever method was chosen, candidates still presented the required information from the outcomes.

Working in a Laboratory and Practical Skills

The course covers a wide range of scientific laboratory work, and it may be unlikely that the staff member timetabled has experience from all areas. It is deemed good practice to involve specific members of staff for advice and even to assess/teach areas that the timetabled staff may find difficult. An example of this includes members of physics staff demonstrating the safe handling of radioactive sources. The same arrangements have been used for chemistry and biology aspects of the course for which timetabled assessors may require assistance. In

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

Although the course is not externally assessed and there is no requirement for centres to assess the course through unit tests or final examination, many centres added rigour to the course by making their own short unit assessments for Working in a Laboratory and Practical Skills. Other centres also used their prelim time to timetable practical assessments for candidates.

Many centres used teaching staff or technicians trained to verify outcome 1 in the Practical Skills unit for which various subcultures need to be grown by candidates.

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

In Unit 3 candidates **explained** health and safety procedures when working with radiation.

Calculation evidence was seen throughout the course, rather than just in the Working in a Laboratory unit and especially in processing the results of the practical investigation. 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 examinations. 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.

In some centres a further unit to develop the numeracy skills required for the course had been introduced and worked through.

Some centres added value to the Working in a Laboratory unit with involvement from their science technicians. They demonstrated and supervised candidates in PAT testing 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.

Practical Investigation

There were many examples observed of good planning for the practical investigation. This included clear, well laid out plans showing evaluation of hypotheses and methods.

It was clear that many centres planned the investigations rigorously, to enable each candidate to perform an individual investigation but to plan and evaluate it as part of a team. It was also observed that in some centres candidates carried out practice investigations together, before the assessed investigation, to ensure

understanding of how to plan, carry out and write-up their own investigation independently.

Many centres made decisions to avoid duplication of work, for example, if a candidate performed titrations as part of the Practical Investigation unit and had shown all their volumes (initial/final/used) with appropriate 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, ie headings, units, labels, scales and plotting.

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

Internal verification

Some centres prepared a detailed internal verification policy specifically for Laboratory Science containing dates of assessment periods and clear details of how the verification would be conducted.

Observational internal verification of practical work was documented and clearly visible for external verification.

Internal verification was dated and completed in a timely manner to allow remediation for candidates.

New approaches used during COVID-19

Many centres used new approaches to assessment in this session to alleviate attendance and practical work problems due to COVID-19 restrictions. These included the use of Google Forms to carry out remote self-evaluations and other digital technologies to allow assessment of areas of the course. Microsoft Teams was also used well to discuss any issues with individual candidates.

Specific areas for improvement

Internal verification

Centres should ensure that internal verification takes place within a suitable time after assessment. This ensures that candidates are given feedback as quickly as possible and 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 the assessment for this course as the course is fully internally assessed.

Internal verification must include the verifier's signature and date of verification.

The sample size for internal verification is dependent on the cohort. For a full practical class of 20 candidates, approximately 12 candidates should be internally verified. For any cohort of fewer than 10 candidates, all candidates should be internally verified. The number to be verified should be agreed and documented.

Where visual verification of candidate practical work has taken place, centres should make this clear for external verifiers. This can be best established by including 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.

Centres must ensure that pass/fail decisions on the record sheet must match the evidence available. Some centres had passed outcomes for candidates for which there was no or incomplete evidence that the candidate had performed the minimum requirement.

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 evaluation towards the end. This will ensure that progress is made by candidates on the skills mentioned in their self-evaluations involved in this course, including practical skills undertaken in other units.

In this unit candidates should be encouraged to research their own choice of industries. In some centres duplication of industry choices 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 ASP.

Candidates should provide more details in their candidate reviews, for example how they will work on their goals. Also, the goals should be reviewed in candidate reviews 2 and 3 instead of setting new goals each time.

Candidates should link their CV to one of the laboratory careers they have researched, and they should make better use of their evaluations from their reviews when writing their 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 calculations and ensure the use of units in final answers where appropriate. '*An appropriate number of*

significant figures' for final answers is the guidance associated with external examination in that science subject at National 5 level. If significant figures and units are not considered by candidates 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 working for the calculations.

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 containers are mentioned for storage and not just the material. For risk assessments, candidates must record the state and concentration of all chemicals included.

Practical Skills

Candidates must not be provided with blank templates or partially completed tables. They must create their own tables, including appropriate units and headings.

For radiation safety, candidates must justify why health and safety are important when working with radioactivity. In outcome 2, candidates are asked to explain safety precautions. Each safety precaution must be stated with 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 means less dose.

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 this decision.

Use of technology is acceptable. Examples include word processing for candidates who struggle with handwritten reports and Excel for drawing graphs.

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.