

Inter-board Working Group for A Level Science Practicals

Summary of Cross-Board Trialling of the A Level Science Practical Endorsement

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## 1. Executive summary

As part of the reform of A-level and GCSE examinations in England, changes have been made to the assessment of practical skills in A-level Biology, Chemistry and Physics. Learners will undertake a minimum of 12 practical activities which will be listed in the specification. Their competence in practical skills will be assessed by their teachers. This assessment will include, but will not be restricted to, the minimum activities specified. Teachers will assess learners' practical skills over the two year course of study using Common Practical Assessment Criteria (CPAC), agreed by all of the awarding bodies and the Regulator. They will make a final, holistic judgement about each learner's competence which will be reported separately from the main subject grade, as a Practical Result, on a Pass / Fail basis.

The CPAC cover five competencies:

CPAC 1: Follows written procedures.

CPAC 2: Applies investigative approaches and methods when using instruments and equipment.

CPAC 3: Safely uses a range of practical equipment and materials.

CPAC 4: Makes and records observations.

CPAC 5: Researches, references and reports.

In order to ensure that teachers will be able to use the CPAC to accurately assess learners' performances, Ofqual asked the awarding bodies to trial their use in a qualitative study. The study was undertaken collaboratively and ran throughout the autumn of 2014. It involved 22 schools and colleges, representing a diverse range of those currently following A-level Biology, Chemistry and Physics courses. The trials involved two workshops at which teachers collectively considered the application of the CPAC, together with an intervening period where they used the CPAC to assess learners' performances in a range of practicals. Monitors appointed by the awarding bodies visited schools and colleges during the trials to support teachers in the use of the CPAC.

The main conclusions from the trials are as follows:

- Teachers will be able to use the CPAC effectively;
  - Awarding bodies will be able to monitor the system effectively;
  - Arrangements for the conduct of practicals and for monitoring teachers' assessment will be scalable;
  - Further guidance and support for teachers will be required, particularly in relation to CPAC 2 and CPAC 5, which cover competencies that are not explicitly assessed under the current arrangements of practical examinations;
  - The new arrangements offer significant opportunities to enhance learners' experiences of the development of practical skills.
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## 2. The remit and governance of the trials

The remit for the trials was to:

- Investigate how far the CPAC will enable teachers to make accurate and consistent judgements about learners' practical competencies and to suggest any required amendments to support this;
- Consider the support and guidance that would be necessary for schools and colleges nationally to apply the CPAC effectively;
- Consider arrangements for the conduct and monitoring of practicals for schools, colleges and awarding bodies and make an assessment as to whether these arrangements would be manageable and scalable;
- Consider appropriate and proportionate arrangements for teachers and learners to record practical activities and attainments;
- Engage the wider Science community in the trialling process;
- Make recommendations about appropriate malpractice sanctions.

The trials were run collaboratively by all of the awarding bodies. Ofqual staff were also part of the working group that had oversight of the trials.

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### 3. Participating centres

The trial was a qualitative, rather than a quantitative, study. It was essential, however, that a range of schools and colleges were represented. This range needed to cover:

- Types of schools and colleges;
- Geographic locations;
- Cohort sizes.

The range of participating schools and colleges is analysed below.

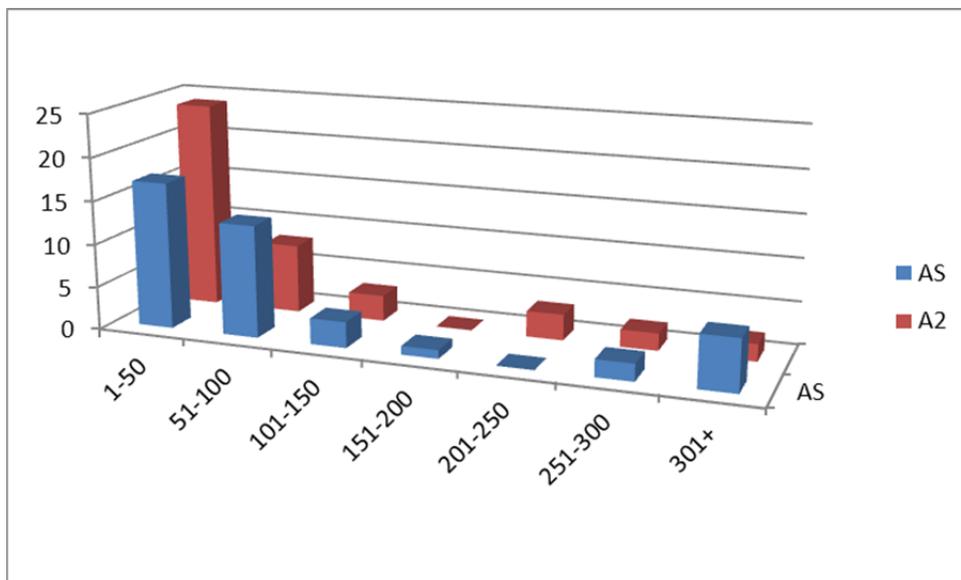


Figure 1: Cohort size by AS and A2

The working group is confident that the range of the centres involved, representing maintained and independent sectors, non-selective and selective, large and small (including outliers, by size from 1-50 to 301+ rather than a large number of similar, medium-sized schools, and by other characteristics), differing levels of learner attainment, urban and rural and drawn from all areas of England allow valid conclusions to be drawn and applied to the introduction of the CPAC nationally.

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#### 4. Operating the trials

The format the trials took involved:

- An introductory meeting at the beginning of October 2014, with teachers from the 22 schools and colleges involved, where teachers, monitors appointed by the awarding bodies mainly from our current pools of A-level Science moderators, awarding body staff and Ofqual staff discussed the application of the CPAC;
- Teachers running a minimum of two A-level standard practicals in October and November;
- Teachers hosting visits from monitors and awarding body staff where learners were observed undertaking practicals and teachers, monitors and awarding body staff discussed the application of the CPAC to learners' activities;
- Teachers and monitors completing feedback forms reflecting on their experiences;
- A feedback meeting on 29 November at which all participants shared their experiences of the trials with each other and awarding body and Ofqual staff;
- A detailed analysis of all the feedback received.

Additionally, a meeting was held in London on 16 December with invitees from a range of institutions representing the wider science community, at which teachers, learners and monitors again shared their experiences of the trials. This event was filmed. The conference, and a subsequent meeting on the trials held on Friday 9 January 2015 at the ASE conference, were in furtherance of the trial's requirement to facilitate engagement with the wider science community.

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## 5. Teacher and learner feedback from the trials

Teacher and learner feedback from the trials has been gathered in two ways:

- Through the feedback meetings;
- Through the feedback forms.

The two tables below summarise the teachers' experiences of applying the CPAC. It can be seen that, in all cases, teachers felt that they would be able to apply the CPAC to make "accurate and consistent judgements about the practical competencies". It is also clear that further guidance, exemplification and support will be required, particularly in relation to the application of CPAC 2 and CPAC 5.

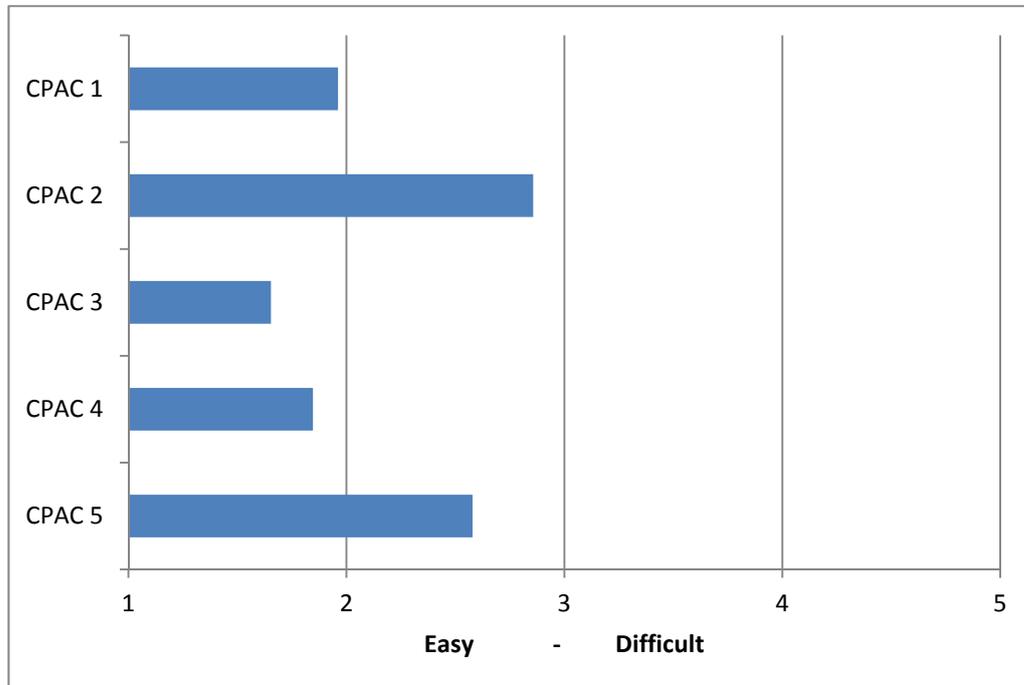


Figure 2: Applying the CPAC

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CPAC	General comments	Documentation
CPAC 1	<ul style="list-style-type: none"> <li>• Generally considered to be straightforward to judge, although teachers would like more guidance on how detailed instructions for students should be.</li> <li>• Instructions for practical work are often verbal, not written.</li> <li>• It is difficult to judge large groups of students for this competency at the same time.</li> <li>• Many students work in pairs or groups, so may be difficult to determine whether individuals are able to follow procedures.</li> <li>• The needs of students with additional needs, such as students with dyslexia should be considered.</li> </ul>	<ul style="list-style-type: none"> <li>• Teachers would like additional information about what documentation is required.</li> <li>• Observation of student performance and student write ups were considered useful forms of evidence.</li> </ul>
CPAC 2	<ul style="list-style-type: none"> <li>• Teachers were unsure what exactly was meant by investigative. For example, what level of decision making is required at this level?</li> <li>• How long should investigations be, and how many should students complete?</li> <li>• Investigations place a burden on resources, because of the need to allow students a choice of materials.</li> </ul>	<ul style="list-style-type: none"> <li>• Teachers thought that student write ups would provide suitable evidence, supported by observations of students carrying out practical work.</li> </ul>
CPAC 3	<ul style="list-style-type: none"> <li>• Generally considered to be straightforward to judge. Ensuring that students are able to work safely is an important element of current practice.</li> </ul>	<ul style="list-style-type: none"> <li>• Although it is easy to judge, some teachers were not sure of the best way to provide evidence for the purposes of monitoring.</li> <li>• Student risk assessments were suggested as a form of evidence.</li> </ul>
CPAC 4	<ul style="list-style-type: none"> <li>• Considered to be straightforward to judge.</li> <li>• Further guidance about what information students should record is needed: what is a good observation?</li> </ul>	<ul style="list-style-type: none"> <li>• Evidence can be provided through student records, though it would also be helpful to check that students' observations are accurate.</li> </ul>
CPAC 5	<ul style="list-style-type: none"> <li>• Teachers thought that it would be difficult to decide whether the required standard had been reached for this competency.</li> <li>• Further guidance about the level of detail that students should include in their reports would be helpful, and information on referencing styles.</li> <li>• Only some centres reported experience of this type of practical activity.</li> </ul>	<ul style="list-style-type: none"> <li>• Teachers thought that it would be straightforward to provide evidence for this competency.</li> </ul>

Figure 3: Summary of teacher responses

The working group will review teacher responses to determine what levels of guidance may be needed. It should also be noted that teachers' comments on the wider impact of the new approach to practicals was positive, suggesting that it would:

- *“(offer) a great opportunity to make skills for the science in practical work play a larger role”;*
- *“(have) the potential to be much better than the present system of assessed practical skills, with more emphasis on developing real skills”.*

The **teachers and learners qualitative experiences of the trials** can best be seen in the film *Teacher and Learner Experiences of the Trials*, the recording of the 16 December.

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## 6. Engaging with the wider community

The working group undertook two feedback events to engage on the trials with the wider science community. These were:

- The London feedback conference

A feedback conference was held in London on 16 December 2014 to which representatives from a wide range of science associations were invited, including members of the societies that make up SCORE.

The conference was filmed, with the consent of all participants, and the film is now available online. The event was held to have been a success, and gave a platform for the voices of those most directly involved in the practicals – the teachers that organise them and the learners that do them – to be heard. The potential that the participants saw for the practicals to “open science students’ eyes” and be “rewarding – not such much grades-wise as knowledge-wise” was most encouraging.

- An event at the ASE Conference

The awarding bodies ran an event at the conference, held at the University of Reading, on 9 January 2015 at which feedback on the trials was given and discussions held.

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## 7. Areas requiring further work

What was clear from the trials was that teachers believe the new arrangements offer great opportunities for doing "good science". What was also clear was that HE is likely to require Passes as part of its entry requirements.

Both of the above factors do not support the view that the new approach will diminish the central importance of practical work in a full Science education.

Through the trial it was found:

- That teachers can use the CPAC effectively and consistently;
- That this view was supported by the monitor visits we ran;
- That more support will be needed, unsurprisingly given that elements of the new approach are innovative, and the awarding bodies are committed to providing this support.

The awarding bodies believe the arrangements are scalable, to cover the national cohort.

More work needs to be done on the monitoring arrangements, and this is underway. More work also needs to be done in a small number of areas: irregularities, reasonable adjustments, carry-forward rules, and all of this is underway and can, we believe, be accommodated within existing arrangements.

The working group will continue to work on the remaining requirements to address feedback provided from the trial with the view to being able to publish finalised requirements in Spring 2015. This timeline is in line with the original requirements from Ofqual and meets the commitments as published in the specifications for all the awarding bodies.

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