

# Tutors' notes: Supporting the effective development of *How science works (HSW)* and *Assessing Pupils' Progress (APP)* in science practice (250 minutes)

## Objectives

To:

- explore the links between the Framework, APP and the level descriptions
- experience how the Framework supports the planning and assessment of 'difficult to teach' areas
- identify the implications and next steps in developing department practice.

## Outcomes

Participants will have:

- clarified how the Framework, APP and level descriptions are linked
- explored planning and assessment using the Framework resources
- identified the leadership actions that need to be taken.

## Resources

- CD-ROM containing copies of all handouts and PowerPoint™ slides
- Presentation handouts
- Laptops – request that participants bring their own
- Highlighter pens
- Reusable adhesive
- Sticky notes
- A3 sheets of paper
- Flipchart paper
- Board marker pens in different colours
- Glue sticks

- **Handout 1.0** Science programme for subject leader development materials (SLDM) 2009–10
- **Handout 1.1** Level descriptions – arranged with all levels together
- **Handout 1.2** The Framework for secondary science: overview and learning objectives
- **Handout 1.3** APP Science assessment guidelines
- **Handout 1.4** APP threads
- **Handout 1.5** Rough guide to levelness
- **Handout 1.6** Rich question strategies for progression, amplification and yearly learning objectives (YLOs) in four difficult areas
- **Handout 1.7** Planning sheet
- **Handout 1.8** Rich questions
- **Handout 1.9** Barriers to learning
- **Handout 1.10** Progression in developing *How science works (HSW)*
- Range of National Strategies resources to support the final session
- Copies of levelness ladders that schools are using or LA has produced
- A Key Stage 4 module used by the department on 'Light', 'Particle models' or 'Earth, Space and beyond' (optional).

## Overview

Session	Outline	Time
Introductory session	Locating department, local authority (LA) and the National Strategies' priorities within the four cornerstones	10 minutes
Session 1 Levels and levelness	Matching the level descriptions to <i>HSW</i> and APP Revisiting levelness	30 minutes
Session 2 Using the Framework resources	Planning and assessing 'difficult to teach' areas	90 minutes
Session 3 Managing the implementation of APP	Discussion and sharing good practice	30 minutes
Session 4 Implications for department practice and development	Revisit the 'eight development steps' task and progress towards the next step or take participants through the task if needed	45 minutes
Session 5 Reflection and planning time	Plan department CPD session or key actions and procedures to move to the next step	45 minutes

## Guidance

The day begins with an opportunity to look at the links between the school's, the LA's and the National Strategies' priorities and how these relate to the four cornerstones. Then participants consider how SLDMs, consultant support and support from other providers enable the attainment of these priorities. This introductory session is to help participants see coherence between the priorities of the National Strategies, those of the LA and those of their own school.

During the first session there is the opportunity to make explicit links between the level descriptions, HSW and APP. Participants then revisit levelness and any levels ladders they are currently using. The next part of the day is for participants to experience how the resources from the Framework website can support the planning, delivery and assessment of some of the more difficult areas to teach. There is an optional task, if time allows, for participants to review how the Framework materials could support the delivery of Key Stage 4. Participants will need to bring along a current GCSE module.

In the third session participants discuss the implementation of APP in their departments, considering potential barriers and solutions. In the last two sessions participants will need to revisit the eight steps of progression and consider where they are and the next steps to move to. It might be necessary to have the handout available from the last SLDM or printed from the *Progressing to level 6 and beyond* DVD. It might be beneficial to supply a number of resources that departments could use to help their practice in particular areas, for example, study guides on creating a progress culture, developing critical and creative thinking or group talk, or arranging to deliver appropriate CPD for the department.

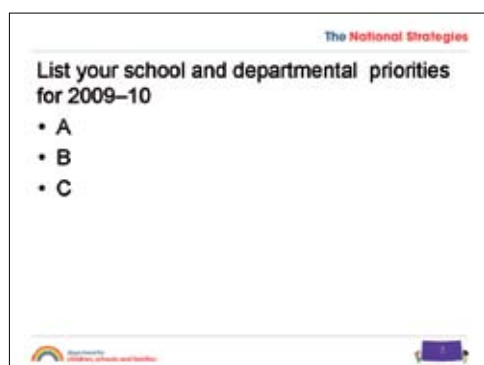
## Introductory session

(10 minutes)

This is an important session to help participants:

- understand the links between national, local and school priorities
- relate all the priorities to the four cornerstones
- see how future SLDMs could help the achievement of those priorities
- consider how other support could also help the achievement of their own school's priorities

Show **slide 3** and begin by asking participants to list three key priorities for their departments.

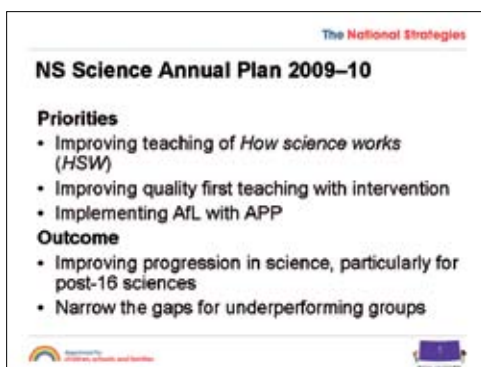


Then show **slide 4** and explain the four cornerstones and how all of the National Strategies' work is underpinned by these. Explain that the National Strategies' priorities are arrived at as a result of evidence from LAs, the work of RAs and Ofsted and so will reflect some, if not all, school priorities.

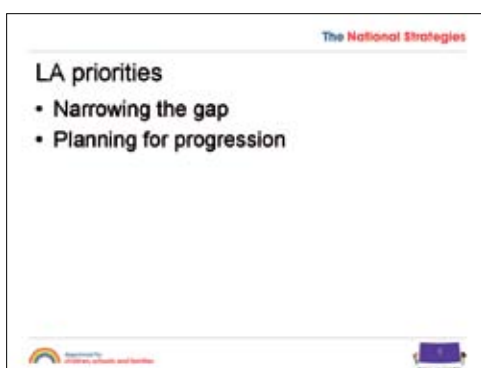


Ask participants individually to draw the four cornerstones onto a piece of flipchart paper. Each person needs to complete a flipchart as they will be adding to this during the sessions. They should then discuss with a colleague where their priorities fit in relation to these cornerstones and annotate the flipchart to reflect this.

Now show **slide 5** containing the National Strategies priorities and ask participants again to discuss which cornerstones these fit under and add them to the flipchart in a different colour.

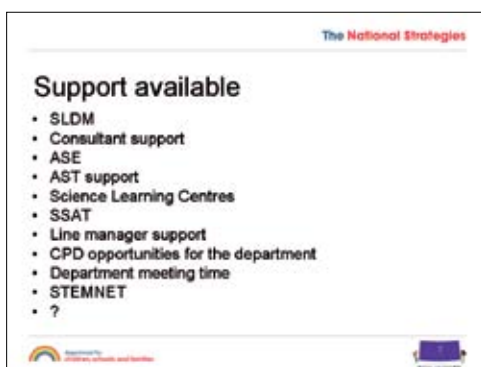


Show **slide 6**, which will need amending to reflect the LA priorities, and ask participants to add these to the flipchart using a different colour from the first two.



Give participants a few minutes to reflect on the point that there are overlaps between these priorities even though they are at different 'levels'. Take brief feedback.

Finally show **slide 7**, which outlines a range of support that could help a department achieve their priorities, and **handout 1.0**, which gives the outline of future SLDM meetings.

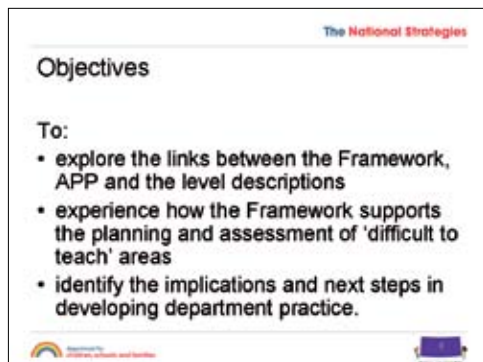


Ask participants to use a fourth colour to indicate which of these SLDM sessions will support their department priorities and then which additional support they are already using or could use to achieve their priorities.

Make the point that SLDMs and consultant support are very much about supporting department priorities and not adding to them. Ask participants to keep this flipchart handy for the rest of the day as they will be adding to it at the end of each session.

## Session 1 Levels and levelness (30 minutes)

Show **slides 8** and **9** to introduce the overall objectives and outcomes for the day.



The National Strategies

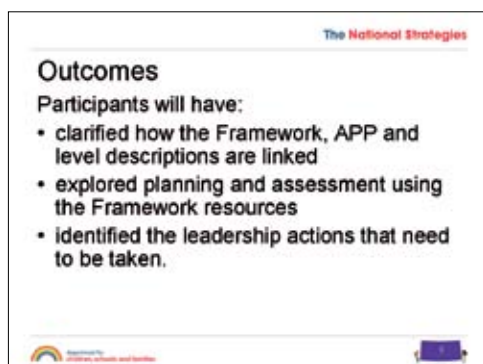
### Objectives

To:

- explore the links between the Framework, APP and the level descriptions
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- identify the implications and next steps in developing department practice.

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The National Strategies

### Outcomes

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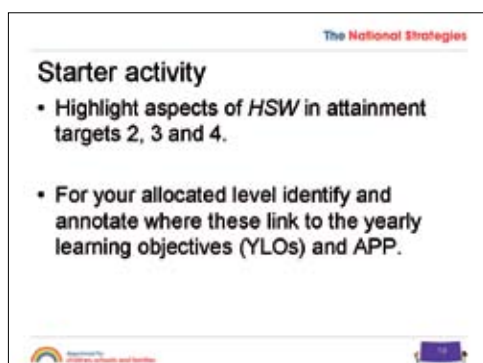
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Explain that because the Framework and APP have been introduced in 'chunks', there is a danger of not seeing how they all fit together and overlap.

### Starter activity

Circulate **handouts 1.1–1.4** and explain that there are two parts to the task which is outlined on **slide 10**. Firstly, ask participants to highlight aspects of *HSW* in attainment targets (AT) 2, 3 and 4. Secondly allocate different groups just one level across the four ATs and ask them to identify where these link to the YLOs and APP. Ask participants to annotate the YLOs and APP documents. Take feedback as appropriate and make the point that this starter aims to show the clear links and overlaps between the three.



The National Strategies

### Starter activity

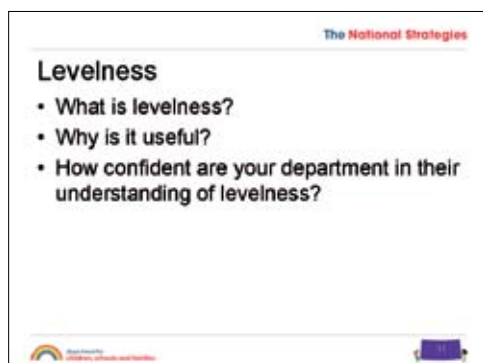
- Highlight aspects of *HSW* in attainment targets 2, 3 and 4.
- For your allocated level identify and annotate where these link to the yearly learning objectives (YLOs) and APP.

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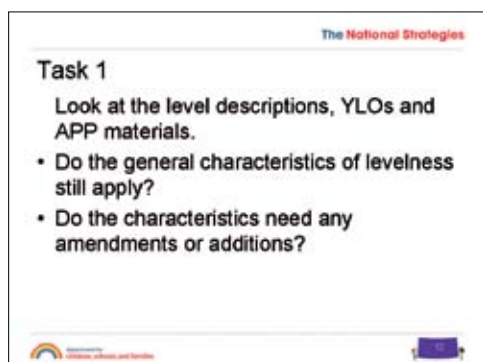
Local Input

Show **slide 11** and ask participants to define what they understand by the concept of levelness and why levelness is useful. This is an opportunity to share some local good practice in levelness.



## Task 1

Participants will need copies of any LA or school levelness ladders that they use or a copy of **handout 1.5** for this task. The task is detailed on **slide 12**.



Now ask participants to look again at the level descriptions, APP and the YLOs and decide:

- if the general characteristic of levelness still applies
- whether additions or adaptations are needed
- what those additions or adaptations would be
- the link between levelness and APP.

It might be important to make the point that levelness will be the same across Key Stages 1, 2 and 3, so that a level 4 or 5 at Key Stage 2 is still a level 4 or 5 at Key Stage 3.

## Additional guidance

*Although level descriptions are intended to be used as a best-fit assessment tool at the end of a key stage and not dissected or used atomistically, there are some aspects that can help daily planning and teaching.*

*Levelness is characterised by progression from using recall and concrete ideas to giving explanations and using abstract ideas. In the Planning and implementing progression CPD unit the differences between the levels is described as follows:*

- *Level 4 is related to concrete thinking and using the correct conventions and terminology.*
- *Level 5 has two aspects: starting to apply concrete ideas to less familiar situations (a focus of the tests at Key Stage 2); and beginning to use abstract ideas (which is not tested at Key Stage 2). It is important to recognise that pupils need to make progress from concrete to abstract within level 5.*

- *Level 6 is about using abstract ideas, models and theories to explain a wide range of phenomena.*
- *Level 7 is related to linking ideas together to make explanations and using patterns and models to make predictions, rather than to form conclusions as in level 6.*
- *Level 7 is about starting to use some quantitative relationships but focusing on proportionality. (This arises from pupils' conceptual understanding. Level 7 is not about putting the numbers into a formula.)*

*The idea of levelness can provide guidance when planning for differentiation. It is not an absolute assessment of the attainment of the pupil. Levelness can be used to help make judgements on pupils' performance on aspects of the programme of study but it does not show that a pupil has achieved a particular level of attainment. Pupils may perform differently and show different aspects of attainment across AT 2, 3 and 4. It might be important to make the point again that levelness is the same across Key Stage 2 and 3.*

## Reflection

Finally, ask participants to reflect on the starter activity and the task and add further actions to their flip chart if they link to their priorities. Make sure they consider the actions from the perspective of the four cornerstones.



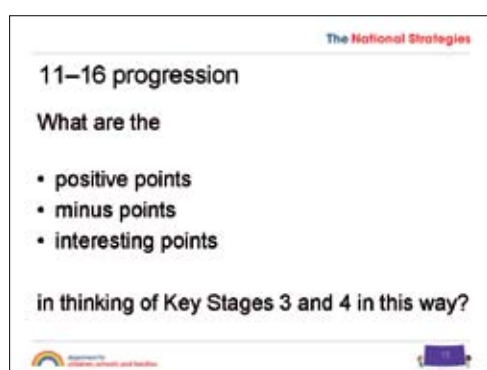
## Session 2

## Using the Framework resources (90 minutes)

If there is time and it is deemed useful, participants may like to decide the approximate levels for each year of the YLOs before beginning this task. When these were written Year 7 was mainly level 5 with some aspects of level 4 because 86 per cent of pupils arrive in secondary school already at level 4. Therefore Year 8 was around level 5–6, with Year 9 mainly at level 6. Year 11 was written with a grade B pupil in mind and the extension column for an A/A\* pupil.

Participants will need copies of **handouts 1.6–1.9** and also **1.2–1.4** from the first session. Explain the relationship between **handouts 1.2 and 1.6** and use this as an opportunity to emphasise progression in science from 11–16.

Show **slide 13** and allow some discussion about viewing Key Stages 3 and 4 as an 11–16 progression using a PMI (positive, minus and interesting points) approach. Take feedback from around the room.



Explain that the four areas of range and content (R&C) chosen for this activity, and on **handout 1.6**, are generally those that are more challenging to teach and for pupils to understand. The four areas are 'Light', 'Behaviour', 'Earth, Space and beyond' and 'Particle models'. Explain the structure of the handout using the following points:

**YLOs** on the left-hand side are the main steps in progression through Years 7–11 extension.

**Amplification** of the YLOs gives more detail about what is meant by the objective and is helpful for teachers writing objectives and outcomes.

**Strategies for progression** – teaching strategies where *HSW* is used to deliver the R&C. This shows how the two should be linked and should complement each other rather than 'compete' with each other. It makes a difference to the way in which the R&C is delivered, so that pupils have the opportunity to think about and explore their understanding, or misunderstanding, of the concept. The *HSW* is not an add-on but a way of teaching and learning. These strategies are aimed at moving pupils to the next step – they are not intended to deliver the YLO for that year.

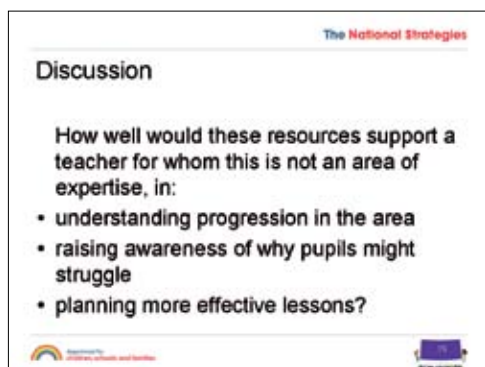
**RQs** can be used in a variety of ways as detailed on **handout 1.8**.

- **Barriers** for the four difficult areas are detailed in **handout 1.9**. These are things pupils find difficult, or common misconceptions.
- All areas of R&C and *HSW* in the same format are available in the Framework. Show where this zip folder can be found either using **slide 14** or via a live link.



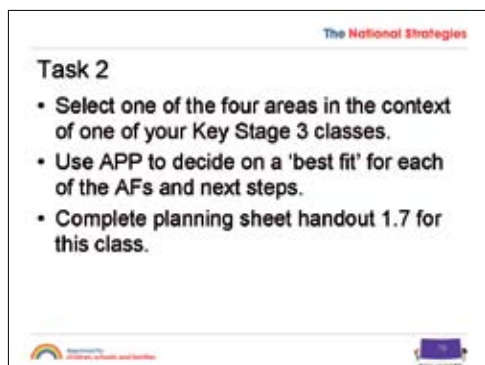
Allow participants sufficient time to familiarise themselves with the new handouts and take any feedback or answer any questions.

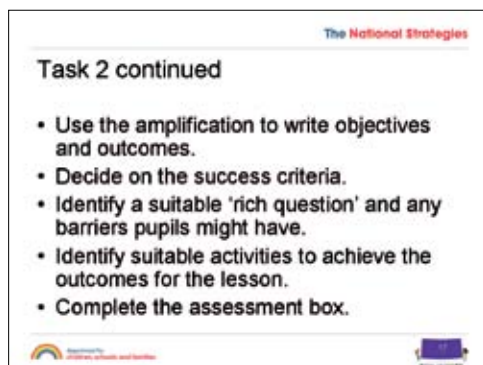
Show **slide 15** and ask participants to discuss how well the handouts would support a teacher for whom this is not an area of expertise to understand the progression in the concept, the problems pupils face and to what extent these resources could improve lesson planning.



## Task 2

This task is detailed on **slides 16** and **17**.

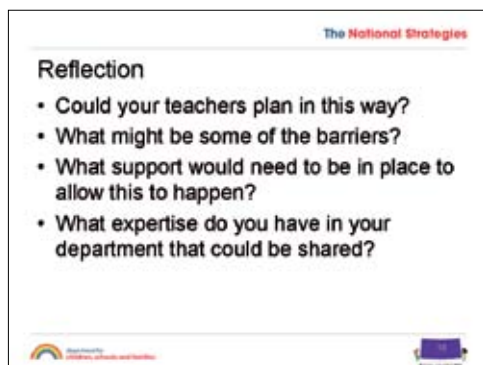




Ask participants to work in pairs or individually for this task, which is detailed in the steps below.

- Select one of the four areas and think about this in the context of one of their Key Stage 3 classes.
- Use APP from **handout 1.3** to decide where the class is for each of the AFs and therefore the next steps. This will be a 'best fit' for the class and for the purpose of this activity.
- Explain that they are going to plan a lesson for this class using **handout 1.7** that could provide evidence to show pupils moving towards the next level in one or more of the AFs.
- Use the YLOs and amplification to write objectives and outcomes. It might be necessary to revisit what makes a good objective and outcome – refer to the appropriate sections in *Creating a progress culture* or Assessment for Learning (AfL) materials. Make the point that the planning process begins with objectives and outcomes – *not* with the activity! Many teachers pick an activity and then think about objectives and outcomes afterwards.
- In the success criteria box identify what pupils will be doing to show they have achieved the outcome. Again this may need to be modelled for participants so that it has an APP/HSW focus or it might need to be made clear why this is an important step in the planning process. If pupils know what they need to do to achieve the outcome then there is no need for pupil speak sheets!
- Select a rich question or make up their own to set the context of the lesson.
- Identify any possible barriers pupils might have and discuss how they will find out what these are.
- Use the 'strategies for progression' to identify suitable activity(ies) to move pupils on. Alternatively, participants can devise their own but they must build in HSW in the same way.
- Use **handout 1.4** to help complete the assessment boxes at the bottom of the sheet. Identify which of the AFs it will allow them to collect evidence for and what the evidence will be. Make the point that the evidence could just be the lesson plan – this is why there is a column to identify the pupils. This might be completed as 'all pupils except...'
- Each pair exchanges plans with another pair for peer assessment of each other's plans. Then they each give constructive feedback and make amendments.

Complete the task by showing **slide 18**.



And asking participants to discuss the process they have been through and what would need to be in place in their departments to allow this to happen. For example, are all teachers clear about planning from objectives and outcomes? Do they need to develop group work? Do they need to improve AfL practice? What good expertise have they already got?

### Optional activity if time

Participants can now be given the opportunity to review how the Framework materials could be used to support or enhance the teaching and learning at GCSE. They will need one or more modules that relate to 'Light', 'Particle models' or 'Earth, Space and beyond', unless you make the full range of Framework materials available so that they could select any module. The zip file could be downloaded from the internet and made available for participants to use on their laptops.

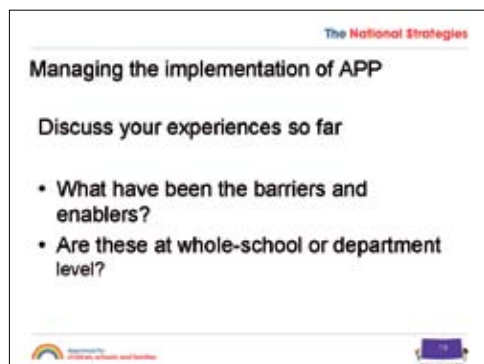
### Reflection

Finally, ask participants to reflect on this session and add further actions to their flip chart if they link to their priorities. Make sure they consider the actions from the perspective of the four cornerstones.

## Session 3 Managing the implementation of APP (30 minutes)

### Local Input

This is an opportunity for participants to discuss the barriers and enablers to implementing APP in science and across the whole school. **Slide 19** can be used to introduce this discussion.



This session is to be used flexibly to share good practice. It will be important to keep the discussions as positive as possible. For example, you may choose to ask one or more subject leaders to present their experiences so far and to identify what has worked well.

Or you may choose to have an open discussion and take some key points as feedback.

Or you may choose to identify a few common issues and focus the discussion on possible solutions.

Or you may choose to ask participants to undertake a SWOT analysis using the grid below.

Strengths	Opportunities	Weaknesses	Threats

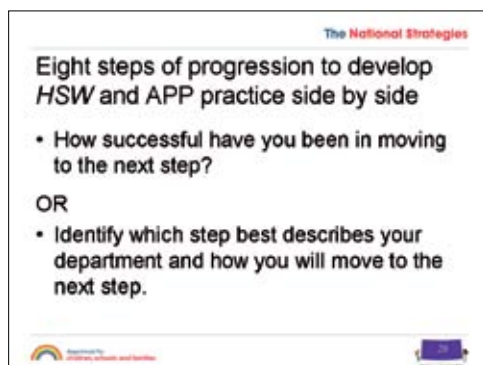
Or you may choose to explore the implications of the removal of the Key Stage 2 tests and APP.

### Reflection

Finally, ask participants to reflect on this session and add further actions to their flip chart if they link to their priorities. Make sure they consider the actions from the perspective of the four cornerstones.

## Session 4 Implications for department practice and development (45 minutes)

Show **slide 20** and **handout 1.10**, which was used during the last SLDM and explain its purpose.



Stress that:

- participants need to focus on the next step and not just the end point
- improving practice in *HSW* will support the implementation of *APP*
- developing *APP* will also support the development of *HSW*
- development in both areas needs to be addressed, but they are 'two sides of the same coin'
- these developments should be part of participants' improvement plans and the activity and resources should help them be realistic about the next steps and how they can get there.

Below are the notes that accompanied the task.

### Participants need to consider:

- the opportunities to gather evidence for assessment that are currently in place;
- the consequences of current *HSW* practice for the implementation of *APP*.

### It may be helpful for participants to work with others who are at similar points in the progression, as they did during the morning session. The important points at this stage are to:

emphasise that underdeveloped or inconsistent *HSW* practice will be a barrier to science departments moving forward with *APP*

help participants recognise that there are steps in the development of *HSW* and *APP* practice and they need to walk before they can run

think about planning how to help the department move to the next step

encourage participants to consider the next step up and record what assessment at this stage could look like and the impact this change will have on the implementation of *APP*

encourage participants to reflect on the actions they will need to take in schools to bring about this change.

## Additional guidance

*Depending on your group, before embarking on the task, you may wish to share some ideas, such as:*

- *use of regular end of unit tests*
- *evidence from assessed group work and discussions*
- *bought-in resources for assessment used at teachers' discretion*
- *bought-in resources for assessment built into the scheme of learning (SOL)*
- *particular activities or opportunities identified in SOL to assess APP*
- *books are marked on a regular basis*
- *all pupils are keeping a folder of evidence*
- *objectives for lesson plans are written in pupils' books*
- *objectives and outcomes are shared with pupils*
- *teachers ask pupils to articulate what success will look like*
- *strategies for progression (Framework) are built into SOL*
- *strategies for progression (Framework) are built into SOL and well used to guide learning.*

Explain the task according to the make-up of the audience.

If there are participants who were at the previous meeting, arrange them in pairs or groups according to where they are on the eight-step progression. Allow time for discussion about progress since the last meeting. Take the main points of feedback from groups at the different steps. They can annotate the flip chart with further ideas and comments during this session.

Participants who were not at the last meeting will need to be grouped separately to undertake the task to decide where they are on the progression and how to get to the next stage.

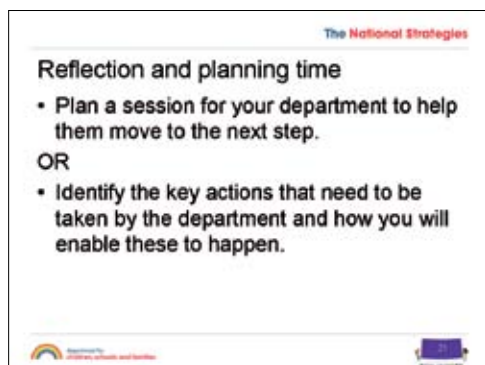
Local Input

Remind them about *Progressing to level 6 and beyond with added HSW* and to what extent this has been used or could be used to support development in the department.

## Session 5

## Reflection and planning time (45 minutes)

Show **slide 21** and explain that this session can be used flexibly to allow participants to either:



plan a department session that will support the delivery of APP and HSW based on moving them to the next step identified above. Participants can work in small groups to develop a shared session.

or

plan the main actions that need to be taken by the department and how they will enable these to happen, based on the annotations made on the flipchart during the day.

A range of National Strategy resources could be provided to support this session, depending on the expertise and experience of participants. Some suggested resources, in addition to the Framework materials or online access, could include:

- *Creating a progress culture* – from *Progressing to Level 6 and beyond with added HSW* (00237-2009 DOM-EN).
- Assessment for learning (AfL) materials – various.
- *Progressing to Level 6 and beyond with added HSW* (00237-2009 DOM-EN).
- *Strengthening teaching and learning in science through using different pedagogies* (DfES 0703-2004G). Also available as part of the self-assessment tool in *Progressing to Level 6 and beyond with added HSW*.
- Previous SLDM resources.