

From weather observations to weather forecast: the story of data at the Met Office

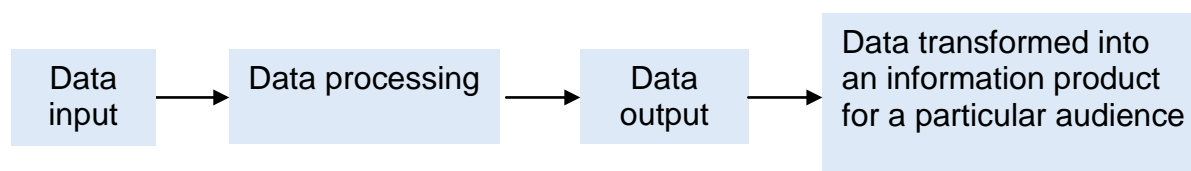
Using peer review approaches in IT

Introduction

A multimedia presentation of the Met Office in Exeter illustrates how advanced technologies – including radar, satellites and supercomputers – are combined with human skills to produce different kinds of information products for different audiences.

The presentation is the springboard for a range of activities that encourage learners to explore complex topics such as using coded data and producing information products that are fit for purpose.

The suggested activities help learners to understand this model:



The activities vary in terms of the level and nature of the IT content, so you may need to adapt them to suit your learners. The multimedia presentation intentionally contains some challenging material so teachers* can meet the needs of more confident learners.

The activities also provide an illustration of how peer review, also known as peer assessment, can be implemented in IT teaching and learning. Peer assessment is a proven method of accelerating learner attainment and enabling learners to become expert learners. The use of the term 'peer review' rather than 'peer assessment' is intended to help learners make the link with what happens in the workplace, where colleagues review each other's work, rather than assess it. Learners will be able to hear Met Office staff talking about how they use peer review.

You will find it useful to read these guidance notes in conjunction with the Peer review area of the IT resources.

We use 'teaching and learning' and 'teacher' as generic terms to include:

- teaching, training and learning
- teachers, tutors, trainers, lecturers and instructors in the further education (FE) system.

There are also good opportunities to use co-operative learning during these activities. You will find additional resources to help you in the Co-operative learning area of the IT resources.

A brief outline of the activities

Activity title	IT content	Suggested approaches
1 What's the weather like today?	A short activity to raise learners' awareness of weather data.	Group discussion using a graphic organiser.
2 The story of a weather forecast	A case study of how the Met Office collects and processes data to produce weather forecasts.	Co-operative learning Criteria consensus Peer review
3 Coding the weather	Encoding and decoding weather information.	Problem-based learning Peer review
4 Weather web page challenge	Transforming coded weather data into a user-friendly information product.	Co-operative learning Criteria consensus Peer review

Getting started

Learners with little previous experience of peer review will benefit from developing their understanding before they undertake these activities. The Peer review area of these resources contains two possible starter activities: **What makes a good peer reviewer?** and **Giving and receiving feedback**.

The activities can take place in co-operative learning teams. Diverse groups of three or four work best. Teams need to have agreed ground rules for working together before they start.

Planning learning in multiple environments

Although described for use by groups of learners, most of these activities can easily be adapted for independent study. The peer review elements can be conducted via electronic communication if face-to-face meetings are not possible.

Teaching and learning approaches

The activities in this section provide opportunities for you to explore a range of active learning approaches including:

- peer review
- co-operative learning
- team projects

- research using multimedia presentation resources
- using graphic organisers
- embedding a wide range of speaking, listening, reading and writing skills.

Embedding literacy, language and numeracy (LLN)

Every learning activity includes many different opportunities to develop LLN skills. Always try to find a naturally occurring opportunity to work on them, where learners can immediately appreciate the relevance and importance of the skills they are learning to use.

Your LLN specialist will be able to help you to:

- identify specific levels and curriculum references relevant to this activity
- create engaging learning activities to develop these skills.

However, you will be able to identify the general LLN skills required as you probably use the skills yourself every day. The activity can be used to help learners develop the skills below.

At Level 1

- Listen for and understand explanations, instructions and narratives on different topics in a range of contexts.
- Present information and ideas in a logical sequence and include detail to develop ideas where appropriate.

At Level 2

- Listen to, understand and follow lengthy or multi-step instructions and narratives on a range of topics and in a range of contexts.
- Express clearly statements of fact, explanations, instructions, accounts, descriptions using appropriate structure, style and vocabulary.

The activities relating to the **Tour of the Met Office – multimedia presentation** generally require Level 2 literacy skills, especially where learners need to analyse and summarise difficult material. Learners with Level 1 literacy skills may need additional support, or may benefit from build-up activities, such as those suggested below.

Useful build-up activities for the LLN elements.

- In pairs, each learner watches a different section of the **Tour of the Met Office – multimedia presentation** and explains it to their partner, who then watches that section themselves.
- Learners write key points onto sticky notes while watching the **Tour of the Met Office – multimedia presentation**, then arrange them in a logical order.
- Learners act out the process described in the **Tour of the Met Office – multimedia presentation** using physical props. For instance, a card saying '20 degrees Celsius' can be passed from learner to learner, with each learner representing a piece of equipment or a person that the data will be handled by. The sequence could start with a thermometer and end with the person presenting the weather forecast.
- Items of software or hardware mentioned in the multimedia presentation are written onto slips of paper and placed in a hat. Each learner draws an item from the hat and says something about it.

Activity 1: What's the weather like today

Introduction

This short opener raises learners' awareness of some of the challenges we face when handling information and data about something as complex as the weather.

Learners use a graphic organiser to identify the features of today's weather, describe each one in everyday language and then translate this information into an item of weather data.

The activity is an essential precursor for **Activity 3: Coding the weather**.

Although simple to organise, the activity requires careful use of questioning and skilled use of prompts, leaving learners enough space to formulate their own answers.

Learning objectives

Learners should be able to:

- identify the difference between weather information and weather data
- describe some of the complex data handling issues involved in dealing with the weather.

Learners will also be able to practise their analytical thinking skills and group discussion skills.

Resources required

- Interactive whiteboard (optional).
- A diagram of a Sunshine wheel (see below).
- Flip chart paper and pens.

Starting points

This opener forms the starting point for a series of activities around the theme of weather forecasting. Learners will be able to use any prior knowledge they have about making weather observations, but such knowledge is not essential.

Suggested approach

Stage 1: Starting the thought process

Ask learners to answer a simple question: "What's the weather like today?"

Encourage them to look out the window to gather information about current weather.

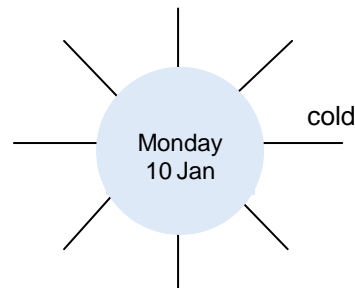
Learners should come up with answers such as: cold, windy, cloudy, raining, sunny and so on. Allow them to use everyday language at this point. Even terms such as 'horrible' or 'nice' are acceptable. The words they come up with can be put at random onto an interactive whiteboard or flip chart, if desired.

Stage 2: Weather information

Learners work in pairs or small groups using flip chart paper and pens.

Show learners a diagram of a Sunshine wheel. Explain that they are going to construct a diagram of today's weather. They can have as many lines coming from the sun as they wish, but five to seven will suffice.

You can help learners get started by drawing this diagram.



Learners put the date in the middle and label each of the sun's rays with one of the features of today's weather.

Stage 3: Weather data

Learners now have to try to add the relevant item of weather data to each of the sun's rays that they have labelled. For instance, if they have used the term 'warm' they might add '20 degrees Celsius (20°C)'.

Learners can obtain some of the data by making their own observations. For instance, they can look at the sky and quantify cloud cover as a percentage. They may be able to estimate the temperature and visibility. They can also supplement their observations by using a weather website, such as the BBC site, where they can enter the postcode and obtain local weather data for today.

Learners may not be able to find a suitable piece of data to go with each of the rays that they have labelled – for instance, if they have said the weather is 'nice'. You might prompt them by asking questions such as: "Can you turn 'nice' into data? Why is it hard?"

Assessment for learning

You will be able to listen to learners' discussions to find out how much they understand about the data handling concepts that arise during the activity. This will enable you to plan how to handle the next stage.

Stage 4: Consolidating and checking learning

The completed Sunshine wheels are displayed and discussed.

Possible questions to prompt discussion.

- Which items of data were easiest to obtain? Why?
- Were there any features of the weather that you could not turn into a piece of weather data? Why?
- What is the difference between information about the weather and weather data?
- What are the advantages of turning weather information into weather data?

What learners might do next

Although this activity is intended as an opener for **Activity 2: The story of a weather forecast**, **Activity 3: Coding the weather** and **Activity 4: Weather web page challenge**, it could also be used as an opener for any topic requiring learners to grasp the difference between information and data. In addition, it can lead into work on databases, with the day as the entity and the various weather features as the attributes. A weather database could then be constructed.

Activity 2: The story of a weather forecast

Introduction

An activity based around the **Tour of the Met Office – multimedia presentation**. The challenge is for learners to create an easy-to-understand description of how a weather forecast is produced, entitled 'The story of a weather forecast'.

The activity is flexible. The story can be told in any format; for instance, as a cartoon strip, a web page or a slide show. The story could even be acted out by the learners. Learners can aim their story at a target audience of their own choice, such as children of a particular age or learners on another course.

Although these guidance notes describe how the activity might work with groups in a classroom or training centre, the activity is also suitable for learners working independently or remotely. Such learners can share their work electronically and give each other feedback.

Learning objectives

Learners should be able to:

- describe the key steps involved in producing a weather forecast
- simplify complex information
- tailor an information product to a particular audience.

Learners will also be able to develop research and analytical skills, and improve their listening and discussion skills.

Resources required

- A means of showing the **Tour of the Met Office – multimedia presentation**, on individual PCs, as well as via data projection. The images and audio clips from the presentation can be copied and used by the learners.
- Resources that allow learners to work in their chosen format, for example, a cartoon strip, a web page or a slide show.
- Optional – role cards from the Co-operative learning area of the IT resources.

Starting points

If your learners are working in co-operative learning teams they will need to have agreed team ground rules. The Co-operative learning area contains guidance on using a co-operative approach.

Activity 1: What's the weather like today? provides an ideal opener, especially for less confident learners.

Suggested approach

Stage 1: Introducing the task

Learners can work in small groups or co-operative learning teams of three or four.

Explain that they are going to study the **Tour of the Met Office – multimedia presentation**. Their task will be to produce an information product called 'The story of a weather forecast'. You may wish to guide them towards a particular format or a particular audience. Alternatively, you may like to allow each group to choose their own format and target audience. Examples of possible information products might include:

- a cartoon strip for children aged 8 to 10 years old
- a series of PowerPoint slides for 16 to 18-year-old learners on a travel and tourism course
- a web page for members of a model aircraft flying club or a gardening club.

If you are following a fully developed co-operative learning approach, learners will benefit from having team roles. You might select some of the following roles.

- Team facilitator – keeps the team on task and ensures everyone participates fully.
- Discussion leader – facilitates team discussions.
- Graphic designer – may design a master slide or template.
- Picture editor – finds suitable images and ensures they are in the correct format.
- Editor – helps the team produce and improve text.
- Reporter – takes the lead in presentations.
- Resources manager – gathers the resources needed by the team.



There are over 20 possible roles – see the role cards in the Co-operative learning area of the IT resources. Roles can be combined where appropriate.

Stage 2: Watching the presentation

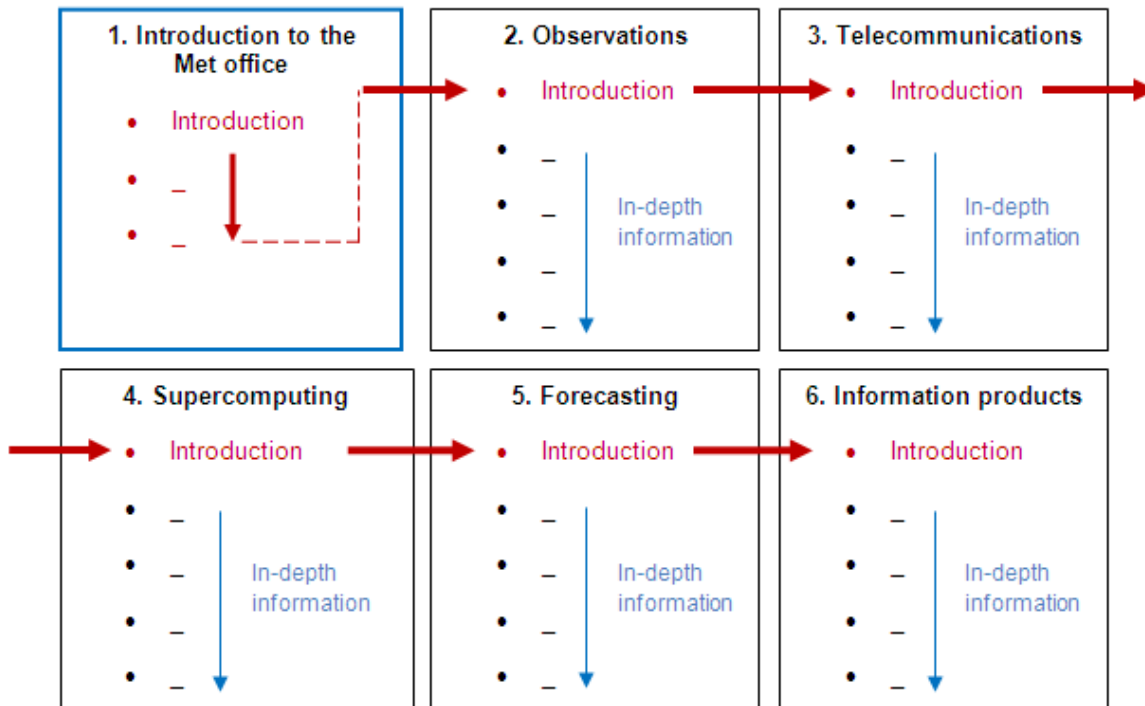
Working individually or in pairs, learners study the **Tour of the Met Office – multimedia presentation** and take notes. At this stage they are seeking to identify the key steps involved in producing a weather forecast. They may need to look at some sections of the presentation several times. You might like to introduce the presentation via data projection and then allow learners to explore it on their computers.

The **Tour of the Met Office – multimedia presentation** is structured as shown below. You may wish to guide learners towards particular parts of the material, or you may prefer to allow them to explore it in their own way. Learners need not be anxious if there are sections they do not understand at this stage.

Structure of the **Tour of the Met Office – multimedia presentation:**

Key:  Recommended route
 In-depth information

Alternative approaches



The audio files are provided as downloadable mp3s. These can be uploaded onto mp3 players for individual use, or within a T3 (Talking Tactile Technology) system for use with visually impaired learners.

Stage 3: Group discussion and planning

Group members come together to:

- compare notes and create an outline or storyboard about how the Met Office produces a forecast
- agree a specification for their product
- plan how to carry out the task.

Learners may need help to specify their product. You might circulate around the groups, using questions to prompt their discussions.

- How long should it be? What is the attention span of the audience likely to be?
- Should it be mainly text or pictures?
- Will it be purely visual or include sound?
- What level of language should it contain? Will there be any technical terms?

- Encourage groups to make a written record of their specification. This can then be displayed during Stage six.

Stage 4: Creating the information product

Group members create their information product. Encourage learners to constantly revisit the multimedia presentation and gradually become familiar with the more difficult material. The images and audio clips from the **Tour of the Met Office – multimedia presentation** can be copied and used in the information products.

Stage 5: Criteria consensus

At this point it will be useful to reach a consensus across all the groups on the criteria against which the final products will be judged during the next stage. The Peer review area of the IT resources contains four methods for doing this.

Stage 6: Peer review

Peer panel is a technique for peer review, sometimes referred to as peer assessment. It involves learners presenting their information products to panels of their peers, who provide feedback and suggestions for improvements. For more information see the Peer review area of the IT resources.

Stage 7: Consolidating and reflecting

Team themes is a technique from the Peer review area of the IT resources. It involves groups reviewing how well they worked together as a team and giving each other feedback on their team citizenship. You might consider awarding bonus marks to individuals who are nominated by their groups for making an exceptional contribution to teamwork.

This stage is essential if you are seeking to embed co-operative learning principles.

What learners might do next

Learners show their information product to their target audience and obtain feedback. Groups meet to discuss the feedback and reflect on the lessons learned.

Activity 3: Coding the weather

Introduction

Can your learners construct a text message that gives details of current weather conditions in no more than 25 characters? To succeed they will need to find a way of communicating weather data using codes that they invent themselves. They will then send their coded message to other learners. Will the recipients be able to decipher the message? If so, the senders can claim success.

Learners will begin to appreciate the complexities of encoding and decoding weather information and gain insight into concepts that underlie many data handling operations. The activity also builds up skills and confidence in handling coded data that will enable learners to succeed with **Activity 4: Weather web page challenge**.

The suggested learning approach is problem-based, allowing learners to work inductively to gain a deeper understanding of data handling issues.

Learning objectives

Learners should be able to:

- understand how information can be translated into coded data
- describe the benefits and pitfalls of using coded data.

Learners will also be able to improve their problem-solving and analytical thinking skills.

Resources required

- Mobile phones or any other means of sending a short text message.
- Access to current weather information via a weather website and through direct observations.

Starting points

Activity 1: What's the weather like today? provides an ideal starting point for this activity. Alternatively, learners could review the Telecommunications area of the **Tour of the Met Office – multimedia presentation**.

Suggested approach

Stage 1: Introducing the task

Recap on **Activity 1: What's the weather like today?** This should have led learners to collect data on various attributes of the current weather, such as temperature, wind strength and so on.

If Activity 1 was done on a previous day, learners will first need to obtain up-to-date data about the current weather. As in Activity 1, they can start by making their own observations and supplement these by looking at a weather website on the internet. You might like to use the BBC weather website, where learners can put in their postcode to obtain local data.

Invite learners to work in pairs and set the following task.

- Invent a way of expressing today's weather as a series of codes that can be sent as a short text message. You can use a total of up to 25 characters (plus spaces). You have to include at least five different attributes of today's weather in your text message.

Allow the pairs a few minutes to discuss the task and then take questions. Try to avoid giving too much explanation. Allow learners time to develop their own ideas.

Stage 2: Encoding the weather data

Working in pairs, learners invent their own way of encoding the weather data into any combination of letters, symbols or numbers. Explain that this string of characters will be sent as a text message to another pair of learners. If the recipients can decode the message, then the senders will have succeeded.

Illustrative example for teacher guidance

A cold, dry and fairly sunny day in January might result in a string of codes that look something like this:

T2 WN15mph 20%Clld R0mm VisVG

This decodes as: temperature 2 degrees, wind north 15 mph, 20% cloud cover, rain 0 millimetres, visibility very good.

Do not give your learners this example. Allow them to come up with their own solutions. They may well surprise you with their inventiveness.

Stage 3: Sending coded data to other learners

Each pair sends their coded data to another pair who writes out what they think the message is saying. They show this to the senders, who confirm whether it has been decoded correctly.

Stage 4: Consolidating and checking learning

Small group discussions and/or a whole group plenary should allow learners to highlight the data handling issues that arise from the activity. Possible questions are listed below.

What sort of mistakes happened during decoding? Why did they happen? (Learners should recognise the need for coding rules or conventions to prevent mistakes.)

What are the advantages of coding data in this way?

- (Learners should recognise how codes save time, are easier to send and easier to display on devices with small screens.)
- Would it be possible to make the text message even shorter? How? (Learners should recognise that the position of each item in the string could indicate what it referred to, thus shortening the message.)

Assessment for learning

The activity will reveal whether learners understand the challenges of working with coded data. This will enable you to judge whether they will cope with the next activity as described in the suggested approach given below, or whether you will need to adopt an alternative approach.

What learners might do next

Activity 4: Weather web page challenge is designed to follow on from this activity. Alternatively, you might wish to take your learners on to the use of codes for programming or for handling data that is being entered into a database.

Activity 4: Weather web page challenge

Learners at Portland Young Offenders Institution helped to develop this activity. Their teacher commented that: “This is a great activity... It shows learners how they can apply their skills to realistic working environments and provides challenge and interest.” One of the learners commented: “I have learned something beyond my knowledge today – it is very interesting.”

Introduction

The **Tour of the Met Office – multimedia presentation** highlights the challenge of collecting weather data, processing it and turning it into a useful information product for the customer. This activity aims to give learners a flavour of that process while providing insight into data handling issues, such as working with coded data.

The activity involves becoming familiar with authentic, real-time coded weather data, as used by pilots. This can be daunting at first glance, but learners enjoy the challenge of decoding the data and turning it into a useful and accessible web page. There is a web design aspect to the task that can be given a central role or a supporting role, depending on your curriculum.

This activity is experiential; it is about learning by doing. Learning can be enhanced if learners tackle the task in small co-operative teams and use peer review – an integral part of the activity.

Learning objectives

Learners should be able to:

- improve their research skills
- develop data handling skills, especially using coded data
- develop skills in transforming data into useful information on a web page.

Learners will also be able to develop peer review and teamwork skills, and improve their communication skills, both oral and written.

Resources required

- The **Tour of the Met Office – multimedia presentation** – available on computers and via data projection, if possible.
- Computers with access to the internet or downloaded data from the Met Office website.
- A copy of the scenario you wish to use (customised for your learners), and/or a specification for the web page.

Obtaining and working with authentic coded weather data

You will need to familiarise yourself with the aviation briefing pages of the Met Office website before embarking on the activity with learners.

The easiest way to find the correct pages is to put 'aviation briefing' into the search facility on the home page. Make sure you look at the 'aviation briefing service', not the 'airline briefing service'. You will need to log in using your name and address. The service is free.

You will find that the aviation briefing pages offer two kinds of real-time weather data: TAFs (Terminal Aerodrome Forecasts) and METARs (Meteorological Airfield Reports). You will find data for locations throughout the British Isles plus guidance on how to decode TAFs and METARs. You may decide to use either the TAFs or the METARs and you may want to direct your learners towards looking at the data for a particular airfield. You will be able to download the relevant data if your learners do not have internet access.

You and your learners do not have to master all the complexities of using the coded aviation weather data; you need just enough knowledge to extract some key information for the weather web page.

Planning learning in multiple environments

This activity can be integrated into individual learning plans in a number of ways.

- As independent study, outside of formal learning sessions. Peer review can take place electronically.
- As an activity in the workplace, perhaps with another learner who is on placement at the same company.

The activity is a particularly good vehicle for embedding literacy, language and numeracy (LLN) and should fit easily into learning plans where learners are working towards key skills as well as IT qualifications.

Starting points

The **Tour of the Met Office – multimedia presentation** and the previous activities in this section of the resource provide a good foundation for this activity. **Activity 3: Coding the weather** will be an essential precursor for most learners, so that they understand the principles of coding weather information.

Learners could review the final section of the multimedia presentation – Information products.

If your learners are working in co-operative learning teams they will need to have agreed team ground rules. The Co-operative learning area of the IT resources provides detailed guidance on using a co-operative approach.

Suggested approaches

Stage 1: Introducing the task

Present a scenario, for example.

You are the IT specialist who is supporting a major three day 'Festival of Flight' event. Attractions will include flying displays and helicopter rides. Your job includes setting up a weather page on the event website so that the public can see what the flying weather is like each day.

Or

You have a friend who belongs to a model aircraft flying club. The club asks you to produce a weather web page for their website so that members can see what the flying weather is like.

You may like to briefly show an example of a TAF or METAR report for a local airfield and explain that they will be working with authentic data, as used by real pilots, and turning it into something user friendly. However, avoid too much explanation – the challenge is for learners to grapple with the coded data themselves.

Stage 2: Planning

Working in small groups or co-operative learning teams of three, ask learners to think about the users of the web page, such as people taking photographs, people wanting a helicopter ride, people flying model aircraft and so on. What information will the users want to see on the web page?

You may wish to convene a short plenary to agree a specification for the web page that the whole group may use. See the example below.

The weather page should include:

- a short news item on today's flying weather, complete with a suitable headline, for the general reader
- a table showing the aviation weather in more detail: wind speed, visibility, cloud cover and height, temperature
- a graphic showing the wind direction as an arrow
- a photograph that captures the general weather situation.

Alternatively, you may wish to introduce a greater challenge by allowing learners to develop their own specification for the weather page. Co-operative learning teams can hold an initial team meeting at this stage to specify the web page and allocate roles.

Team roles for a team of three might be structured as:

- team facilitator and discussion leader
- graphic designer and picture editor
- text editor and jargon buster.

Stage 3: Finding and decoding relevant data

Give learners a clear instruction to search for the 'aviation briefing service' not the 'airline briefing service'. The easiest way to do this is to put 'aviation briefing' into the search facility on the home page of the Met Office website.

Guide your learners through the process of logging onto the aviation briefing service on the Met Office website. They will need to give their name, but can use the address of their learning provider. When asked about their purpose, they can insert 'study' in the box marked 'other'.

Learners investigate the aviation briefing pages and identify the coded data that they will use. They can do this individually, or in pairs. Teams can then come together to discuss and decode the relevant data.

Assessment for learning

Carefully observe how learners approach both their individual work and their work with others. Invite learners to join you in learning conversations about how their work is progressing. Instead of asking 'Are you okay?' try asking 'What are you finding difficult?' or 'What would you like to know more about?'

Stage 4: Implementing the web page

Learners collect or create digital assets to implement their design. They might need to do some or all of the following, depending on their specification for the weather page.

- Take a digital photograph of the current weather or download a suitable copyright-free image from the internet.
- Write the text for a news item about today's weather.
- Create a wind direction graphic.
- Create a table based on the data that they have decoded.

Stage 5: Peer review

Learners review each other's web pages and provide feedback. This can be done in a number of ways. Pair and share or a peer panel are two possible approaches. Guidance on using these approaches can be found in the Peer review area of the IT resources. Learners can then improve their web pages in response to the feedback.

Stage 6: Consolidating and reflecting

Team themes is a technique from the Peer review area of the IT resources. It involves learners reviewing how well they worked together as a team and giving each other feedback on their team citizenship. You might consider awarding bonus marks to individuals who are nominated by their teams for making an exceptional contribution.

Alternatively, you might consider a technique called 'Role review', in which the people from each team who hold the same role come together to reflect on their experience of performing that role and think about how they might do it differently in the future. Further guidance can be found in the Peer review area of the IT resources.

This kind of reflection is essential if you are seeking to embed co-operative learning and peer review principles.

You might also encourage your learners to discuss how they coped when faced with something daunting, such as the TAF or METAR data.

- What did they find most difficult? Why?
- What strategies did they use?
- How might these be applied to learning other difficult topics?

This kind of reflection will help learners to become more expert in their own learning.

Differentiation

Learners can work with the TAF or METAR coded data at their own level. Some will find it sufficiently challenging just to decode the wind speed, temperature and visibility. Others will set themselves the challenge of decoding the whole bulletin.

Organising learners into small co-operative learning teams opens up many opportunities for learners to be supported by peers or give support to others, while team roles allow individuals to practise skills that they need to develop.

Alternative approaches

If learners find it too difficult to use the TAF or METAR coded data, they might try using the AIRMET regional forecasts from the Met Office aviation pages. These are still quite technical, but provide some narrative, making them easier to use.

More confident learners may like to combine weather data from several sources. They may even be able to use satellite and radar images to help them comment on current cloud cover and rainfall in the relevant location.

What learners might do next

Learners studying web design might undertake an appraisal of the Met Office website and produce a report suggesting improvements.

Learners with an interest in hardware and telecoms might investigate how an automated weather station works. Some colleges have their own weather stations, often for manual observations. Learners might propose how the weather station could be updated so that observations are automatically fed into the college intranet.