

# Video Conferencing in the Classroom

Communications Technology  
across the Curriculum



**A RESOURCE BOOK FOR TEACHERS**

**Written by Tim Arnold, Steve Cayley and Mike Griffith**

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# Introduction

**Video conferencing is - quite simply - a vehicle for interactive communication. Like all good ideas, it is very straightforward. It enables one set of people to see and hear people in a different location. It brings the world into the classroom, enabling pupils to speak directly to their peers and to experts in other places around the world. When used effectively the technology becomes invisible and provides a powerful learning experience. Through videoconferencing, pupils improve their speaking and listening skills and their presentation skills as they work with different audiences in different locations.**

This publication gives you the information you need to enable you to start using video conferencing in your own classroom. As well as information about the technology itself, there are ideas about how to use it in each curriculum area.

Geography classes can ask others, "What is it like where you live?" They can discover and explore similarities and differences between geographical locations at home and abroad. Your pupils become the "experts" as they share their knowledge and understanding of their region with other pupils, or present their GCSE English oral talk to students in another part of the country ....or the world.

Don't be surprised when previously disillusioned children become motivated, when a link to a French or German school adds value to your MFL programme and when seeing artefacts from museums and talking to experts create deeper levels of understanding; and don't be surprised when pupils ask pertinent questions of eminent professors or other experts and when your classes' knowledge and awareness about other cultures and nations increase as they speak to them face to face.

Enthusiastic and motivated teachers and their school partners have developed all kinds of exciting projects using video conferencing as a communications resource in the classroom. Like all technologies, though, it is fairly useless without effective teaching. This guide provides teachers with practical examples which other teachers have found work!

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*This publication is part of the DfES "Video Conferencing in the Classroom Project" which aims to disseminate information and good practice through direct practical support to individual teachers in their classrooms, professional development, the museums and galleries programme and the online resource for teachers [www.global-leap.com](http://www.global-leap.com).*



**SECTION A:**

# What do you need to Video Conference

**IN THIS SECTION:**

**What Is Video Conferencing?**

**What Do I Need to Get Started?**

**Video Conferencing Systems**

**Choosing a Video Conference System**

**Communications Links**

**Creating the Right Environment**

**Application Sharing**

**Multipoint Conferences**



# WHAT IS VIDEO CONFERENCING?

**At its simplest, video conferencing is a tool which allows users to see and hear the person they are communicating with. Video conference calls are usually point-to-point calls which set up a direct link between participants. Calls can be made locally, nationally or across the world.**

Multi-way or multipoint conferences are also possible where more than two users or groups take part in the call; these will be discussed later.

To make a video conference call each user needs some form of video conferencing system and access to a suitable communications link.

Video conferencing systems come in a variety of formats - some are computer based, some are dedicated units - but all have a number of common features:

- **Camera**
- **Microphone**
- **Speakers**
- **TV or Monitor**
- **Methods of establishing a connection to remote users via on-screen options**

The choice of system should depend on its intended use. Some systems are only suitable for person-to-person or small group use; others have the facilities to support use by whole classes.

A video conference allows you to take part in live audio/video presentations in your classroom, and to collaborate through them.

It is possible to video conference between two classrooms in the same town, or between two classrooms in different parts of the globe. The distance between each location is only restricted by the ability of each site to make the required connection.

Live video conferences differ from other multimedia resources, such as video recordings or television presentations, **because they are interactive**. You are meeting and talking face to face with someone else in 'real time', but in a different location.

Successful video conferencing in the classroom requires the technology to take a backseat and allow you to concentrate on the content and delivery of your video conference event or lesson.

Video conferencing is **not** 'big and scary' or too complicated, technical and beyond your capabilities. It does **not** need to take up excessive amounts of time, once you have mastered the basic techniques associated with any new, unfamiliar resource.

Video conferencing **is** exciting, stimulating, and easy to use with practice and confidence, and has the potential to totally involve pupils. It is perfectly within the possibilities and capabilities of what you can achieve in your classroom. The list of resources available to the teacher in the

classroom is changing and becoming more sophisticated day by day. Equipment based on new technologies is being developed all the time, extending our ability to communicate and collaborate with greater ease.

However, it is ultimately the skill and ability of the teacher in harnessing the technology that will determine the success of video conferencing in the classroom.

**Mike Griffith, Global-Leap.com**

## WHAT DO I NEED TO GET STARTED?

### VIDEO CONFERENCING SYSTEMS

A video conferencing system must be able to fulfil the following tasks:

- **Establish a link to another user**

Much as a telephone call is made by dialling another user, a video conference call is made either by dialling the other user's ISDN number or selecting the network address of the other user if the unit is on a network. Most systems will have an on-screen address book or directory in which numbers can be stored.

- **Enable the user to hear and see the user at the far-end**

(in video conference terminology 'far-end' refers to the video conferencing system you are contacting and 'near-end' refers to your end).

All video conferencing systems need speakers and a suitable screen (computer monitor or television/video monitor depending on the system).

- **Provide a means of controlling the sound**

This is a major issue. The quality of sound will have a significant impact on the usability of the system for teaching and learning.

All units need a microphone and speaker. These may be built into the computer if using a computer-based system or built into the video conferencing system and monitor if using a dedicated system.

If the microphone and speakers are in close proximity there is potential for sound to loop between the speakers and the microphone resulting in howling or acoustic feedback.

Some units have methods of controlling sound such as echo cancellation and noise suppression systems. Others do not have sophisticated sound control and require the use of a headset for acceptable results.

- **Provide a means of controlling the video**

A camera is a standard feature on all video conferencing systems. Some are simple, cheap web cams, others are more complex with automatic focus and gain control. Some dedicated units include cameras that can be controlled (moved up and down, from side to side and zoomed in and out) using a remote control. Some can be voice activated

where the camera will move to focus on the person talking. Some can be controlled from the far-end, enabling users at the far-end to choose what they want to see.

Many systems have the facility to attach video players, cameras and computer presentations. Only PC-based systems have the facility to share computer applications. Schools can also use PC systems linked to the Internet alongside a video conference system to show, demonstrate and share PC applications simultaneously with their far-end partners.

## CHOOSING A VIDEO CONFERENCE SYSTEM

It is possible to video conference with systems ranging in price from about £50 (in addition to the cost of a suitable computer) to those costing in excess of £15,000. The choice of system will depend on how it will be used and the budget available.

### CLASSROOM QUALITY SYSTEMS

Experience suggests that there is a number of factors to consider when buying a system which is suitable for use in the school environment with whole classes, as opposed to systems which are used for small group or one-to-one conferences.

- Good quality audio which will pick up students speaking from where they sit.
- Good quality camera with auto focus, contrast and brightness.
- Remote controlled camera - controlled from a handset with the ability to pre-set positions (e.g. to pick out participants at the touch of a button).
- Mute facility to easily mute outgoing audio at the touch of a button.
- Ability to support a range of display devices including TV, plasma, video/data projector, interactive whiteboard.
- Ability to plug in a video player, camcorder, document camera or digital stills camera to present video or images to the far-end.
- Ability to plug in a video recorder to record conferences.
- Ability to plug in a laptop (or connect via a network) to share applications such as PowerPoint presentations.

In general this range of facilities is only available on Group Systems (see below).

### TYPES OF VIDEO CONFERENCE SYSTEM

Most units fit into one of three broad categories:

- **Low-cost, computer-based systems**
- **Desktop Systems**
- **Group Systems**

These descriptions of the types of system available give an initial guide as to the most suitable type of system for a particular application. Budget will certainly be a significant factor but the purchase of inappropriate equipment can prove to be a false economy.

Which communications link, ISDN or IP, to use is another important issue. This will be determined by who a school plans to link with, i.e. will links be with users connected via ISDN, IP or both? (See Communications Links below).

## LOW-COST, COMPUTER-BASED SYSTEMS

Most new computers, particularly multimedia systems, already have speakers and a microphone. By adding a low-cost camera, such as a web-cam, it is possible to video conference across a network or the Internet. Suitable only for personal one-to-one conferences where the quality of sound and picture is not critical.

**Cost Range:** In the region of £50 for a camera to add to an existing computer

## DESKTOP SYSTEMS

A small unit, which includes the camera, is connected to a computer. The unit may include echo cancellation to control the sound and will usually incorporate the microphone and camera and may include the speakers. These units are primarily used for network-based conferencing. Suitable for personal one-to-one conferences or small group use. Can be used across ISDN or networks depending on model.

**Cost Range:** In the region of £400 - £900 to add to an existing computer

## VIDEOPHONES

Videophones also fall into the category of desktop systems. As its name implies it is a telephone unit with a small built-in screen and camera.

They can connect with other videophones or the more expensive dedicated units.

Control of the sound is good, enabling hands-free calls to be made. Additional cameras and monitors can be attached. Suitable mainly for individual use or groups of two or three. Good for one-to-one meetings. Can be used in multipoint conferences.

**Cost Range:** £600 - £1200

## GROUP SYSTEMS

There is a range of self-contained units available in this category. Most sit on the top of a normal television and use the television for picture and sound, or they can be linked to a data projector. The unit may contain the microphone or have a table microphone attached. The camera is usually built in as part of the main unit. All functions, including camera movement, are usually controlled by a remote control or remote keyboard.

Some units support the use of dual screens (one to show the near-end, a video being played or an image from a document camera and the other to show the far-end). Suitable for all uses from one-to-one up to whole-class use.

**Cost Range:** £2500 - £15,000 plus

*For more detail about the types of systems available, see Section G.*

## COMMUNICATIONS LINKS

A communications link is required, over which a video conference is established. A video conference signal requires more capacity than a normal, voice-only phone line can provide. A video conference system will use either an ISDN link or network (IP) based link. Some systems can use both. Classroom-quality video conferencing requires a minimum bandwidth of 128K. This might be ISDN or IP connectivity.

Key issues are the bandwidth of the link and quality of service of the link. Greater bandwidth can give better quality picture and sound. There are a number of technical constraints that might affect your bandwidth and the quality of service that you can achieve.

### ISDN (Integrated Services Digital Network)

ISDN is a dial up service but as its name implies is a digital service. ISDN can be supplied in a number of configurations; the most common used for video conferencing is the ISDN 2e service.

Being dial-up it is used in much the same way as a normal telephone line. It is simply a matter of dialling the number of the far-end; a direct link is then established for the duration of the call. Both users must have compatible ISDN lines installed and have ISDN compatible video conferencing equipment. ISDN is implemented worldwide, opening up the possibility of conferencing with users in different countries. ISDN is currently a reliable option for video conferencing.

In the UK ISDN services are available from British Telecom and in some regions are also available from other suppliers such as cable companies. Because it is a dial-up service it is paid for according to the destination and the duration of the call. There is also a rental charge for the ISDN service. (For more details of charges see 'Running Costs' below.)

*More details of ISDN are given in Section G.*

### IP-BASED VIDEO CONFERENCING

IP-based video conferencing is conferencing across computer networks. IP video conferencing is only possible across networks with sufficient capacity available for the conference.

Networks within a school generally have sufficient capacity to support video conferencing. Although the capacity of a network may be known, the number of users sending data across the network at a particular time will also affect the performance of a video conferencing system.

**Broadband** networks connecting schools is making local and regional IP-based conferencing more of a possibility; this is because the network is effectively a private network linking the schools. There is a number of technical and performance issues that have to be addressed when video conferencing within and between networks.

The Regional Broadband Consortia (RBCs), which manage the regional grids for learning, are implementing a variety of approaches for providing video conferencing via broadband. For more information on RBCs see the BECTa website <http://broadband.ngfl.gov.uk>.

It is also possible to video conference across the Internet but because there is no guarantee of capacity from one end of a link to the other the results can be unpredictable. Points of congestion will interrupt the continuous audio and video stream. This means that video conferencing across the Internet is less suitable for an educational situation where a teacher is relying on the conference working as part of a lesson.

*More details of IP video conferencing are given in Section F.*

## WHAT COMMUNICATIONS LINK TO USE?

The choice of communications links will mainly depend upon who you plan to conference with. Schools purchasing equipment should consider the need for systems that will support both ISDN and IP-based conferencing. Where schools are moving from ISDN to broadband for their Internet access it is worth considering retaining the ISDN line for video conferencing with other ISDN-based users until a gateway is available for them to use.

The choice of communications link will mainly depend upon who you plan to conference with. Many organisations that schools conference with are ISDN based, although many larger organisations are considering the use of IP-based systems. IP has the advantage of being free of call charges. Over time there is likely to be an increasing move to IP-based conferencing as the technical issues are resolved. (See Section F.)

Because the two systems are very different, a 'gateway' between the two is required to conference between ISDN and IP. This equipment would not normally be set up in a school but may be provided as part of a regional or national network. The use of a gateway will allow schools to use IP only based conferencing systems and make ISDN calls via the gateway. The school would not then need its own ISDN line for video conferencing. Schools should check to see if their RBC has or is planning to set up a gateway.

## CREATING THE RIGHT ENVIRONMENT

Although video conferencing equipment can be used in most environments, there is a number of factors that will enhance the experience for you and those at the far-end.

The requirements of the environment are linked to the type of system you are using. For example, a PC-based system used with a headset can be used in all but the noisiest environments, but a dedicated system with a sensitive microphone will pick up every sound within a room.

The following guidelines relate primarily to the use of Group Systems with a class or larger group and they suggest the ideal environment. Many schools will not be able to take on board some of these points without dedicating a room to video conferencing; however, some factors simply relate to how a room and participants are arranged.

## SOUND

*It is considered that 85 per cent of the information disseminated in a video conference is delivered aurally, so getting the audio right is a high priority.*

- Choose a room that is acoustically 'dead'. Ideally, it should be carpeted and have 'soft' wall covering such as hessian boards or curtains. A good test is to stand in the room and speak loudly. If you hear a reverberation or echo, the video conference system will too. The worst case scenario is to have glass walls as the sound reflects off them. Bear in mind, though, that people act as baffles; the more people in a room the better, and often a very reflective room will be perfectly useable with five to ten people in it.
- Switch off any heaters or air-conditioning systems that produce a 'hum'. These will be picked up by sensitive microphones, making it difficult to hear quiet voices. The air flow itself can also have a severe effect on audio input. A simple test is to place a tissue on the table by the microphone to see if it is disturbed by airflow. If it is, the audio may be affected.
- The room should be as undisturbed as possible by external noise. A camera that is set to track voices and focus on the person talking can be 'fooled' by other noises. Multipoint conferences often rely on the voice of a contributor to switch to the person talking - again other noises in the room can 'fool' the system. Use of camera 'pre-set' buttons often helps in a 'formal' environment.
- The space should be laid out so that those taking part are equidistant from the microphone - ideally between three and five metres.
- Know how to MUTE your system. Muting switches off your microphone, which is particularly important when listening to contributions from the far-end. Use of the mute is especially important during multipoint conferences to avoid the audio control switching to your camera at the wrong time.

## LIGHTING

- It is not normally necessary to bring in specialist lighting. Most modern systems have the ability to adjust to local conditions with specific software controls. However, it is important to have some control over natural and artificial lighting. In practice, if a room is to be used regularly, it is better to cut out natural lighting and use artificial lighting, over which you have control.
- Lighting should fall on the faces of those taking part in the conference to give a good picture to the far-end. The key to good lighting is to have no shadows. Shadows effectively double the amount of movement the video conference system has to process and thus the video quality can be significantly reduced. A simple test is to place your hand about one foot from the top of the table surface where most participants will be. If you can see a significant shadow the lighting is too direct. To reduce this effect use as many diverse lights as possible. Diffusers can be placed over fluorescent lights. A light-coloured table top, avoiding white, helps reflect light into the faces of the participants, increasing image quality.
- Don't sit in front of a window - this will produce good silhouettes but will mask the detail of faces. Avoid strong backlighting from windows or low lights behind those taking part.
- Turn off any computer screens that are in view.

## BACKGROUND

- Avoid cluttered backgrounds. A single-colour background, perhaps with a sign or logo to identify the school, is better than lots of pictures, work or posters. A plain pastel colour is best - a pale blue is a good colour to start with.

## ARRANGEMENT OF THE ROOM

*This will depend upon the type of conference and the number of people involved but the following guidelines will help:*

- Ensure that all those taking part are in the camera shot, ideally facing the camera and not obscured by rows of computer monitors. The less unnecessary furniture in the room, the better. Avoid sitting around a huge conference table.
- Ensure that those speaking can be clearly identified.
- If numbers involved are small, aim for a 'head and shoulders' shot of the participants.
- If numbers are large, it may be necessary to move those contributing nearer to the camera and microphone for parts of the conference - however, aim to keep movement to a minimum.
- Ensure that all those taking part can see the screen. A large television is usually sufficient. The signal from the unit can be projected using a data projector, but this can sometimes result in a poor resolution picture, so experiment before use.
- The camera should be positioned close above or below the screen, and presenters should look directly at the camera so it appears to those watching at the far-end that they are looking directly at them.

## DRESS

- Because video conferencing cannot reproduce fast movements or quickly changing areas, it is better to wear plain clothing - avoiding stripes or chequered patterns. Some bold colours, particularly reds, do not work well.

# USING OTHER COMPUTER APPLICATIONS WITH VIDEO CONFERENCING

It is possible to show applications such as PowerPoint to the audience at the far-end.

It is also possible to share applications, such as Microsoft Word or Excel, so that changes made by one user will be seen by the other. This enables collaborative work on documents, drawings or data to take place whilst a video conference is in progress.

This can be done using some video conferencing systems or via the Internet. *For more details see Section F.*

St Peter's High School in Exeter linked with their partner school in Bamberg, Germany to share a Mathematics lesson. The teacher in Exeter taught both classes using a software application called Omnigraph which allows the user to create graphs and see the effect of changing variables. The application was shared so that the users at both ends could see the graphs being created during the lesson and see the teacher.

## MULTIPOINT CONFERENCES

Conferencing between two sites is called 'point to point'. When there are more than two sites it is called 'multipoint conferencing'.

Multipoint Conferencing Units (MCUs) facilitate conferencing between more than two sites at the same time. MCUs act as a central bridging device that can link a number of users into a single conference. An MCU is often referred to as a 'bridge'.

The style of the conference may dictate how many users it is sensible to link at any one time. For example, when a high degree of interaction between all the users is expected, it is usual to restrict the conference to three or four other users. Where one centre is simply presenting, then more could be linked.

In practice, each centre will dial into the MCU and will be connected into the conference. There are two common methods for controlling who is on screen at any one time:

- Continuous Presence - where each centre is on all the screens all the time, usually displayed in a portion of the screen, e.g. four centres - each in a quarter of the screen.
- Voice Activated or Audio Follow - where the centre which is speaking at that time is shown full screen.

MCUs can be expensive pieces of equipment and the centre that hosts an MCU must have adequate incoming communication links. With the reduction in the cost of MCUs and the increased availability of group systems that include multipoint capability, some larger organisations such as local authorities are purchasing their own systems.

Currently some regional broadband grids are considering implementing MCU support.

A number of companies offer multipoint conferencing as a service. This service is usually charged based on the number of systems connected and the duration of the call.

## SECTION B:

# Getting Started

### IN THIS SECTION:

**Knowing Your System**

**Introductory Video Conferences - five step-by-step ideas**



# KNOWING YOUR SYSTEM

It is essential that users feel confident using their video conferencing system.

A good way to start video conferencing is to link with another school, ideally one that you already know, and plan a range of activities together. You can develop your skills and confidence at your own pace and take advantage of the many opportunities there will be for working together.

The first step for the teachers and children is to become familiar with the equipment and learn how to make best use of it. This comes quickly with experience and is absolutely essential for the success and sustainability of any video conferencing initiative.

## Ensure that users can:

- Set up the system. If your system is disconnected and stored between use, ensure that users can reconnect it. Draw a diagram and label cables and connections. Check that batteries are in remote controls and that spare batteries are available. Prepare a 'Quick Start' guide for colleagues who may have been unable to attend the training or who might need a reminder.
- Plug in the line that will make the connection (ISDN, IP or both).
- Switch the system on!
- Make a call - initially to an automated test system.
- Control the camera.
- Mute the sound when necessary.
- Check the picture you are sending to the far-end using picture-in-picture.

## Later you may also want to:

- Attach a video cassette player or camcorder to play in pre-recorded video to the far-end
- Attach a camcorder to act as a second camera
- Attach a video cassette recorder (VCR) or DVD recorder to record a video conference
- Attach a digital stills camera to show pictures to the far-end
- Attach a document camera to show artefacts and pictures
- Attach a PC to show presentations

## TRAINING

Contact your Local Education Authority, City Learning Centre or Regional Broadband Consortium to see if they run training courses on using video conferencing in the classroom. If you need help arranging training, contact [www.global-leap.com](http://www.global-leap.com) or email [tjarnold@devon.gov.uk](mailto:tjarnold@devon.gov.uk)

# INTRODUCTORY VIDEO CONFERENCES

It is well worth taking the time to practise with a friendly 'far-end' before starting to set up curriculum links. When you use the equipment for the first time there will be the excitement of the children seeing themselves on television to contend with and then the excitement of seeing their first far-end partner. You will need to take this into account and build a familiarisation and 'settling down' period into your first sessions.

## These sessions can take a number of forms:

The 'Video Conferencing in the Classroom Project', offers regular sessions called "My First Video Conference", suitable for all Key Stages, intended for teachers and pupils who haven't video conferenced before. To sign up for one of these sessions, visit the Global Leap website [www.global-leap.com](http://www.global-leap.com) and click on 'Video Conferencing lessons and events for schools - book your place'. You will need to add your details to the Global Leap Classroom Directory to be able to book one of these "My First Video Conference" sessions.

The aim of these sessions is to enable everyone to feel relaxed and comfortable using the equipment and to iron out any audio or other practical issues involving the equipment or the room. It is also an opportunity for teachers to see how additional cameras, and perhaps a laptop, can be used to incorporate pictures, text or objects into the lesson, and to observe their class's participation in, and reaction to taking part in, a live link.



Observing and taking part in the session with their class often helps teachers to begin to think creatively about how they themselves could develop ideas for video conferencing applications. It also gives them the opportunity to ask any questions, note what might work successfully and highlight what could be improved in the room environment that they are using.

Alternatively, here are some ideas for introductory video conferencing sessions you can set up yourself. First you need to establish a link with a teacher in another school with video conferencing facilities. Ideally this will be someone you know in your own area, but there are plenty of other options - with so many schools starting to video conference, there will always be schools looking to establish links. You can try your local education authority which may well have details of schools in

your area with video conferencing facilities. You can also visit [www.global-leap.com](http://www.global-leap.com) and click on 'Classroom Directory' where you will find contact details of video conferencing primary and secondary schools around the country.

See Section D 'Making Contacts' for further information

## IDEA 1 - PRESENTATION AND Q & A SESSION

### STEP ONE

Contact the teacher in your partner school and arrange a date, a time and a structure for your video conference.

### STEP TWO

Do a test call with the school to check that both sets of equipment are working and that contact can be established. (see FIGURE 1)

### FIGURE 1

Making a video conference call is straightforward.



When you turn on your video conferencing system you will see a startup screen. Select 'make/place a call' and enter the ISDN number or IP address.



When the call has been established, the picture of the far-end will appear on the screen.

### STEP THREE

#### **Both schools need to do the following preparation:**

As a class, prepare a presentation which will be delivered by a small group of pupils, each member of which will talk about an aspect of the school and locality. Build in opportunities for questions, discussion and other interaction.

To assist with the smooth running of the conference, it would be helpful to liaise with your partner teacher in advance of the conference over the presentations and what questions the pupils will ask.

**STEP FOUR**

Practise the presentation with the video conferencing system, paying special attention to the seating arrangements, who is going to chair the conference and who is going to speak when. You will also need to decide who is going to operate the camera and what camera shots you are going to use, using the preset facility of your system if you so wish. (see FIGURE 2)

**FIGURE 2**

If your camera can be remotely controlled, you operate it using the arrows and the zoom in and out buttons on the remote control.

During a conference, you will probably want to use a shot of the whole group as well as close ups of individuals and small groups.

As part of your preparation, the camera operator, who can be the teacher, classroom assistant or one of the children, can use the 'pre-set' facility to set up all or some of the shots beforehand. When you select the preset number during the conference, the camera will automatically go to the pre-selected shot.

**STEP FIVE**

The conference itself. Arrange in the class in the positions you planned in step four. Select the 'near-end' picture you want your partners to see first. Dial up your partner school. Carry on with the conference as planned.

**STEP SIX**

When the formal part of the conference is completed, you and the pupils will be more relaxed. Allow some time at the end for an informal session when the pupils can ask each other additional questions. This section can involve the rest of the class as well as the original six initial participants.

## IDEA 2 - PRESENTATION AND Q & A USING ARTEFACTS

### STEP ONE

Contact the teacher in your partner school and arrange a date, a time and a structure for your video conference.

### STEP TWO

Do a test call with the school to check that both sets of equipment are working and that contact can be established.

### STEP THREE

#### **Both schools need to do the following preparation:**

Each pupil in the class, or a selected group of pupils, needs to bring an artefact to school which best represents themselves, an aspect of themselves, the school or the locality. They need to be prepared to talk about this artefact for 30 - 60 seconds.

### STEP FOUR

Practise the presentation with the video conferencing system, paying special attention to the seating arrangements, who is going to chair the conference and who is going to speak when. You also need to decide on who is going to operate the camera and the camera shots you are going to use, switching from shots of the artefacts to shots of the speakers, using the preset facility of your system if you so wish. You may decide to attach a camcorder or document camera to the video conferencing unit to show the artefacts. (see FIGURE 3)

**FIGURE 3**



When you are video conferencing, you can attach a camcorder to the video conferencing system and use it as a second camera during a video conference.

**Step one** - plug the camcorder into the auxiliary input on the video conferencing system. Remember only to plug the yellow plug in, which carries the picture, not the red or white plugs, which carry the audio and would cause feedback.

**Step two** - select the auxiliary input using the handset





**Step three** - the picture from the camcorder will appear on the screen.

In addition to using the camcorder to quickly select close-ups of speakers in a spontaneous discussion, you can use the camcorder for showing pictures, documents and artefacts.



**Step four** - use the handset to return to the main camera on the video conferencing unit.

### STEP FIVE

The conference itself. Arrange in the class in the positions you planned in step four. Select the near-end picture you want your partners to see first. Dial up your partner school. Carry on with the conference as planned.

### STEP SIX

When the formal part of the conference is completed, you and the pupils will be more relaxed. Allow some time at the end for an informal session when the pupils can ask each other additional questions. This section can involve the rest of the class as well as the original six initial participants.

## IDEA 3 - PRESENTATION AND Q & A USING A DIGITAL STILLS CAMERA (NB some video conferencing systems do not support this feature)

### STEP ONE

Contact the teacher in your partner school and arrange a date, a time and a structure for your video conference.

### STEP TWO

Do a test call with the school to check that both sets of equipment are working and that contact can be established.

### STEP THREE

**Both schools need to do the following preparation:**

Take 12 pictures of your school and neighbourhood, using a digital camera with a video or AV output.

As a class, prepare a presentation which will be delivered by a small group of pupils, each of whom will talk about one or two of the pictures. Build in opportunities for questions, discussion, other interaction.

#### STEP FOUR

Practice the presentation with the video conferencing system, paying special attention to the seating arrangements, who is going to chair the conference and who is going to speak when. You also need to decide on who is going to operate the camera and the camera shots you are going to use, using the preset facility of your system if you so wish. Practise playing the digital pictures into the presentation. (see FIGURE 4)

**FIGURE 4**



When you are video conferencing, you can play pictures from a digital camera to the far-end.

**Step one** - plug the camera into the auxiliary input on the video conferencing system.

**Step two** - select the auxiliary input.

**Step three** - the digital pictures will appear on the screen as you select them on the camera.

**Step four** - return to the main camera picture on the video conferencing unit.



#### STEP FIVE

The conference itself. Arrange in the class in the positions you planned in step four. Select the near-end picture you want your partners to see first. Dial up your partner school. Carry on with the conference as planned.

#### STEP SIX

When the formal part of the conference is completed, you and the pupils will be more relaxed. Allow some time at the end for an informal session when the pupils can ask each other additional questions.

## IDEA 4 - PRESENTATION AND Q & A USING VIDEO CAMCORDER

(NB some video conferencing systems do not support this feature)

### STEP ONE

Contact the teacher in your partner school and arrange a date, a time and a structure for your video conference.

### STEP TWO

Do a test call with the school to check that both sets of equipment are working and that contact can be established.

### STEP THREE

#### **Both schools need to do the following preparation:**

Take a video of your school and locality using a camcorder. For instance, you might arrange with your partner school that you each make a video lasting about six minutes of various aspects of the school, for instance the school buildings, the playground and school grounds, the displays in the classroom, a sports session, an extract from a lesson, and lunchtime.

Then split the class into six groups, each of which will do 60 seconds or so of videoing. Each group would then prepare a presentation which would include their videoclip. As a class, prepare a presentation which will be delivered by six pupils, one from each group, each of whom will talk about their topic, illustrated by the relevant part of the video. If you don't want to show all the video, you can select the parts you want by taking a note of the counter/timecode beforehand. Build in opportunities for questions and discussion.

NB. The picture quality of the video viewed at the far-end may be variable, so experiment before the conference. Short clips should be suitable for use during a conference, although if you plan to use longer sections, you might consider sending them a copy on a tape, CD or DVD in advance for them to use before the video conference rather than in the video conference link itself!

### STEP FOUR

Practise the presentation with the video conferencing system, paying special attention to the seating arrangements, who is going to chair the conference and who is going to speak when. You also need to decide on who is going to operate the camera and the camera shots you are going to use, using the preset facility of your system if you so wish, and check that you know how to play in the video.

Practise playing the video into the presentation. The far end will hear the soundtrack on the video but they will also be able to hear you speaking, so you can add your own comments while the video is playing if you so wish. (see FIGURE 5)

**FIGURE 5**

When you are video conferencing, you can play video to the far-end by either connecting a video player or a camcorder to the video conferencing system.

**Step one** - plug the videoplayer into the auxiliary input on the video conferencing system. The yellow phono plug carries the picture; the red and white phono plugs carry the audio picture of camcorder attached to unit.

NB If you are using a camcorder, switch it to play. When it is set to record, the sound will feed back and make a loud humming noise. If you don't want the sound, only use the yellow plug.

**Step two** - select the auxiliary input using the handset.

**Step three** - the video will appear on the screen as you play it on the videoplayer or camcorder.

**Step four** - return to the main camera picture on the video conferencing unit.

**STEP FIVE**

The conference itself. Arrange in the class in the positions you planned in step four. Select the near-end picture you want your partners to see first. Dial up your partner school. Carry on with the conference as planned.

Rather than School A doing their whole presentation, then School B, you may decide to structure the conference so that School A's presentation of each section is followed by School B's presentation of their corresponding clip. This will encourage comparison and discussion.

**STEP SIX**

When the formal part of the conference is completed, you and the pupils will be more relaxed. Allow some time at the end for an informal session when the pupils can ask each other additional questions.

## SECTION C:

# Planning for the use of Video Conferencing across the Curriculum

### IN THIS SECTION:

**English**  
**Maths**  
**Science**  
**Art and Design**  
**Citizenship and PSHE**  
**Design and Technology**  
**Geography, Education for  
Sustainable Development**  
**History**  
**Modern Foreign Languages**  
**Music**  
**Physical Education**  
**Religious Education**  
**Special Needs**



**As you gain confidence, you will want to extend your use of video conferencing to support activities across the curriculum.**

**As an essential part of curriculum planning, you will want to consider:**

- **Medium and long-term plans - where can video conferencing best support your work?**
- **Who best to conference with to add value to your lessons**
- **How to plan for successful conferences**

### **VIDEO CONFERENCING OFFERS:**

- A range of opportunities for speaking and listening
- Opportunities for 'real' communication
- Access to experts and expertise outside the classroom

### **ITS USE CAN RESULT IN:**

- Increased student motivation
- Improved speaking skills
- Improved listening skills
- Progress in foreign languages
- Increase in confidence and self esteem
- Impact on cultural awareness

Video conferencing's unique quality is its facility to enable and encourage interactivity. Unlike a video or a DVD, you can stop whoever is talking to you and communicate directly with them.

### **WHAT CAN YOU DO WITH IT?**

#### **Some ideas for teachers and pupils:**

- Links with other schools - local, national and international
- Whole class links, small group links, links between individual students
- Opportunities to work co-operatively, present work/ideas to each other, share visitors
- Support for gifted and talented pupils - networking between a cluster of schools to engender collaborative links
- Support for groups of pupils and individuals who don't easily have access to the full curriculum. This might include pupils who are geographically isolated and pupils with special educational needs
- Team teaching
- Delivery of examination courses - sharing expertise between schools or using an external provider
- Links with experts - many museums, galleries and other organisations can provide expertise for schools via video conferencing
- Cross-phase links - pastoral support for transition/support for transition within subject areas
- Links with higher education - universities are increasingly using video conferencing to support the entry process
- Multipoint links - involving more than two locations

## Some ideas for teachers and trainers:

- Lesson observation - teachers and trainee teachers can observe lessons in classrooms anywhere in the country. They can also comment on a lesson while it is in progress without causing disruption and talk with the teacher and pupils afterwards, if they so wish.
- Opportunities for CPD - there is considerable value in links between teachers to share ideas and disseminate effective practice.
- Shared staff meetings - there are lots of possibilities here. For instance, you could have a speaker between two or three schools, saving on costs (both for the speaker and for travel) and time. You could meet up to discuss the implications of a new syllabus, or just discuss good ways of teaching a difficult topic.
- Opportunities to share expertise about special educational needs.
- Mentoring - teacher mentors can link with higher education staff. Experienced teacher mentors can train and support new teacher mentors.
- Assessment - lessons can be observed remotely and recorded, if required, for assessment purposes.
- Trainee teacher support - trainee teachers on school placements can use video conferencing to discuss their lessons, share ideas, plan work together and discuss resources.

*The first edition of this book included examples of work going on in schools throughout the UK linked to case studies on the BECTa and Global Leap websites. There are 45 case studies - practical examples of video conferencing being used in the classroom - currently available on the websites and these are being added to all the time. Details of these case studies are listed in the grid in Appendix 1 at the end of this section. If you would like to add a case study of your own to the website, please use the template on [www.becta.org.uk](http://www.becta.org.uk) and [www.global-leap.com](http://www.global-leap.com), where you'll also find guidelines and details of where to send it.*

## CURRICULUM USE OF VIDEO CONFERENCING

- The model of students getting together, presenting work to one another and following up with feedback and discussion is one that can be productively applied to all curriculum areas. With the increasing emphasis in the National Curriculum on awareness of different audiences, video conferencing can provide real audiences of all kinds. As well as linking with contemporaries in the UK, similar links can be made with students of different ages, with groups of adults, with students in different countries and, in fact, virtually any group of people with access to video conferencing equipment.
- There are also occasions in all curriculum areas when groups of students in separate locations can benefit from working together on projects or ideas, either as a one-off experience or a series of links over a period of time.
- The ability to link with experts outside the classroom is a benefit of video conferencing which can also be applied across the curriculum. As the number of schools with video

conferencing capability increases, so too does the number of 'experts' ready to share their particular expertise, specialisms and experience with schools.

Here are some specific examples of how video conferencing can be used in different curriculum areas. This is not an exhaustive list of opportunities, just some ideas to get you started. Do have a look at some other curriculum areas besides the ones you are particularly interested in, as a lot of the ideas are transferrable.

## ENGLISH

The most powerful aspect of video conferencing is its potency as a communication tool. For English teachers, the chance for their pupils to talk to a variety of audiences is invaluable.

There is a range of possible activities which fall broadly into four categories:

- Performance and follow-up
- Working collaboratively - comparing and contrasting, discussion and argument
- Gaining access to different cultural contexts
- Gaining access to experts and research

Here are some examples of each.



### Key Stage 1, 2 and 3

Each idea can be linked to a number of National Literacy Strategy and KS3 Framework for Teaching English objectives and adapted to suit age-related expectations. See the grid in Appendix 2 at the end of this section for examples.

**Performance.** Video conferencing can add an extra dimension to performance of any kind. As well as performing poems to classmates, you can perform them to a class in another school and they can perform theirs to you. As well as adding to the enjoyment and motivation, the discussion that would follow about how to improve the readings would also be very valuable.

Video conferencing encourages talk at all key stages. It can be used to encourage talk between children about a variety of topics, for instance sharing a story, describing school routine and events, talking about a favourite object or discussing a familiar class activity.

At Key Stage 1, using a soft toy like a teddy bear can be an excellent starting point for a video conference link. Schools can exchange teddy bears, then the bear sends home a diary by email describing its adventures, the places it has been, as well as the things it has seen and done and, of course, recounts its adventures by video conference. This activity can also enhance understanding and acceptance of diverse cultures.

**Working collaboratively.** Link your class with a class from the same year group in another school. Decide with your link teacher which books/poems you are each going to read - for instance, you might each read different texts by the same author. At an appropriate stage,

video conference with the other class to discuss a writer or a specific text.

This could either be a whole class activity, a small group activity or a combination of both. The video conference/s will need to be planned and structured, which you could do via email beforehand, either with the teacher or involving the children as well.

**Collaborative writing.** Video conferencing can also be used in conjunction with email to support collaborative writing. Groups of children could structure and plan a story together. One group could then write the first chapter as planned and email it to the second group to write the next chapter and so on. Video conferencing could be used at appropriate stages in the process to review and adjust the work.

**Debate and Argument.** Numerous National Literacy Strategy objectives are linked to *arguments, discussions and persuasive writing*.

Video conferencing can provide an ideal forum for debate and argument of all kinds. You could set up a debate with your partner school when you each present one side of an argument. Alternatively, each point of view could be presented by a group including children from both schools, so they would have to video conference BEFORE the debate to prepare their presentation.

Other ideas include comparing the effectiveness of leader writing and/or advertisements from local papers, or adverts on your local commercial radio station (which you could send to your partner in advance of the discussion). You could perhaps invite someone from the paper or radio station into one of the schools to join the debate.

You could extend your study of persuasive writing by asking children in each school to choose what they consider to be an effective piece of persuasive writing. The pieces could be read, deconstructed and discussed and then, perhaps, marked for effectiveness. Adding a fun and competitive edge to the proceedings can, again, add a whole new dimension to the proceedings. The possibilities are endless.

**Gaining access to different cultural contexts.** Video conferencing is an ideal way of experiencing other cultures at first hand. Children at school in an inner city area could benefit enormously from linking with a school in a distant rural area to discuss a book which is set in the countryside. Schools in areas of more limited cultural diversity in the UK could perhaps link with schools with a multi-cultural intake, either in the UK or elsewhere, when studying a text or poetry. These links need not be 'one-off links' simply to study a text together, they could be the beginning of rich cross-curricular links between the two schools.

**Research/linking with experts.** Video conferencing is a great way to gain access to experts. Many schools will have local authors and other experts who may visit their school to work with the children. Video conferencing allows you to share your experts with others and to benefit from their experts. For instance, if a local author visits your partner school you can video conference with them in advance and plan questions together and who is going to ask what.

The children at your partner school may also be a valuable source of information if a book or story is set in their locality and you want to find out more about it. You could, for instance, study myths and legends set in your partner school's locality (which they could send or email to you), then set up a video conferences to ask questions and discuss them.

**Assessment at Key Stage 3.** Video conferencing could be used to support peer and self evaluation of performance within speaking and listening assessment tasks.

**The above ideas can be adapted for use at Key Stage 4 as appropriate.**

**Assessment at Key Stage 4.** In Year 10, for example, video conferencing can be used to support the assessment of the GCSE Speaking and Listening Extended Individual contribution. Make a link with a Year 10 English group in another local or UK secondary school and arrange for the two groups to make presentations to one another. The audience, although they are peers, are an "unknown", which helps to introduce an element of formality to the assessment. It also, of course, brings an interesting new dimension to the classroom. Technology, when it works and is at its best, is always a means of motivating students.

**Reading.** As well as improving students standards of speaking and listening, there are many ways in which video conferencing can enhance students' reading:

- It can inform the social and cultural dimension of texts. For instance, a link with the Anne Frank House when studying *The Diary of Anne Frank*, The Imperial War Museum when studying war poetry, or the National Archive when studying Dickens would add an invaluable extra dimension to the work.
- Networking promotes wide reading for pleasure - talking enthusiastically about a book you have just enjoyed reading.
- It raises the status of talk in the students' eyes.
- It provides an arena which requires certain conventions, e.g. speaking slowly and clearly, considering presentation skills and not fidgeting.
- It gives students another platform to demonstrate their ability to discuss texts in some depth without formulating a written response.

For English teachers, embedding video conferencing in the curriculum - essentially a very simple information and communication technology which puts the emphasis squarely on the *communication* - can offer a lively and interactive way of raising the standard of attainment in the subject at all Key Stages.

## MATHS

There are various ways in which the use of video-conferencing can enhance teaching and learning in the maths classroom. Imagine these scenarios:

- You have a couple of particularly gifted students whose attainment and understanding is significantly beyond that of their peers. These two often feel isolated and frustrated, repeating work they have already understood, or working on their own. Yet it can be difficult to provide them with challenging work, while still meeting the needs of the rest of the class. Instead, they could video conference with other students like themselves at other schools, working on more challenging problems, jointly sharing methods and solutions.

- You have a group of students who want to study an aspect of the syllabus for which you do not have a teacher in your school, for instance a certain A level module. If they joined a class elsewhere by video conference, not only would they get to study the module they want, but one of your staff could also see how it's taught, giving them in-service training on the module.
- You have a group of students whose maths is perfectly competent, but who are plainly bored with it all. They could video conference with a group at another school, taking turns to present a problem for the other group to work on, and presenting their solutions to a problem previously given to them. The contact with other students, and the chance to plan work for them, would liven things up a bit, and give them greater motivation.
- You have a small class (maybe at a small primary school, where there are only a few students in any given year group), and they don't have many opportunities to hear other students talking about maths. Two such classes could share maths lessons via video conferences, with their teachers taking it in turns to teach both sets of students. Students would get to hear other students talking about how they work things out, and also hear other teaching methods and styles.
- You have a group who can't see why they need to study maths at all, not seeing any relevance to themselves and their futures. They could 'meet' people who use maths in their working lives, and find out more about how people actually use maths, and why it is so important.
- You have a class where no one wants to talk about maths, except to answer the teacher's questions as briefly as possible. They could video conference with an expert, who could set them some problems which would lead them down unusual paths. They would need problem-solving skills and team-building skills to solve the problem successfully. They would need to plan who was going to do what, to collaborate on carrying out tasks, and to discuss the way forward. They might even have some fun!
- You have a teacher who is not qualified as a maths teacher, but would like to observe good practice and take part in team teaching with a more experienced colleague. Why not use video conferencing for this?

Video conferencing is a great way for students and teachers to experience an enriched curriculum, enabling them to move beyond the limits of their immediate situation. 'Enrichment' is appropriate for all students, not just those labelled 'gifted and talented', as it gives all students a context for the mathematical techniques they learn. If masterclasses are not available in your local area, perhaps your students could access them via video conferencing. It also gives them the opportunity to have fun in maths! Why should maths miss out on special events?

Get together with another school, and agree a set of objectives which you would use video conferencing to achieve. These might include:

- increasing students' ability to communicate using appropriate mathematical vocabulary and symbolism
- increasing interaction and collaboration between students working on mathematical tasks (both within the class and between classes)
- giving students a genuine audience to present their work to
- enabling team work, where each sub-team does part of a piece of work, then video conferencing is used to put it all together.

It can be really hard to encourage purposeful mathematical communication between students about maths. How many times have you asked a student to explain something interesting, and all they can come up with is “You know, that stuff we did last Tuesday.” Now suppose that student has to explain something to another group via a video conference. They’re going to have to think of a better explanation than that, because the other group won’t have a clue what went on last Tuesday. Students really enjoy getting together with others of their own age, and finding out about what they are studying, and they often find it easier to understand the explanations children their own age make, because they use ‘kid’s language’.

Here are some other ideas you could try:

**Group work.** Schools could join together on a “problem solving” project. Each school in the group agrees to implement a “Problem of the Week” initiative where a different mathematics problem or investigation is displayed prominently around the school each week. Each school promotes this by offering prizes for the best solution, mentioning in assemblies, etc.

Pupils from each school present their solutions to each other and share their thoughts on future problems they might work on.

**Access to experts.** It’s always good for students to have access to different teachers, different areas of expertise and teaching styles. You could set up a video conference link with a maths teacher in another school using the same exam board that your students are following, ideally one who is an examiner or marks papers for that board, although this isn’t essential. The teacher could talk to the students about exam technique and classic misconceptions and errors which s/he often comes across when marking papers.

Students would need to prepare beforehand and be ready to present some answers to questions on specific topics during the session. The students might also work together on a question to produce a joint “best performance” answer to present. The teacher could offer a critique of these answers and further advice specific to those particular chosen topics.

You could reciprocate by doing the same for the group from the other school - or present something different based on a particular area of your own expertise.

**Motivate** is a real-time video conferencing project for schools that enables students of all ages (5-18) to interact with professional mathematicians and others with a real interest in maths. This gives them the opportunity to find out about how people actually use maths, to see what relevance it might have to their own futures, and to find out why they are learning the techniques they are taught. Students also have an opportunity to work on material which depends on their curriculum studies, but extends it in unexpected ways.

Motivate also provides courses in using video conferencing in maths. These could include a video conferenced lesson to get students used to working with video conferencing, or a video conference as a focus for a maths day.

*Information about Motivate can be found at [www.motivate.maths.org](http://www.motivate.maths.org)*

**Links with higher education.** Higher education institutions are increasingly using video

conferencing for promotion and marketing. If the opportunity arises for you to link with a university, as part of the link you could arrange for your students to talk with a subject expert. For instance, link with a mathematician and get them to talk to the pupils about what mathematics is really about, why it is exciting, etc. They may be able to show how they go about solving a problem (at a level appropriate to the pupils) 'in front' of them and have a discussion afterwards.

The mathematician could then set the pupils an interesting, novel or quirky problem that was accessible to all pupils at some level. The students could also pose problems to the mathematician.

Regular feedback and discussion sessions would ideally be planned during the period that the children were working on this problem, providing a 'surgery' for problems, suggestions for extensions to the problem, etc.

In addition to all the ideas for using video conferences to enrich maths lessons for your students, don't forget the possibilities for your staff in holding regular conferences with their colleagues in another school. You could have a speaker between two or three schools, saving on costs (both for the speaker and for travel) and time. You could meet up to discuss the implications of a new syllabus, or just discuss good ways of teaching a difficult topic.

## SCIENCE

Video conferencing can be used at all Key Stages to develop and extend pupils' subject knowledge through contact with the wider scientific community.

**Access to experts.** At Key Stage 2 this could include using specialist science staff and technicians at local secondary schools and colleges as well as scientific institutions such as museums. For example, The National Maritime Museum presents a session on the solar system and the Tower of London presents one on "The Science of the Longbow". Pupils will have identified key questions for the museum staff that can be emailed in advance of the link, and may also ask to be shown, if possible, particular artefacts over the link to support their area of study.



At Key Stages 3 and 4 and at Post 16 links could be established to University departments, national and international bodies and through special projects such as links to science-based expeditions.

**Supporting transition.** Video conferencing can help to support transition from primary to secondary school. Bridging projects can be set up and developed via a video conferencing link, enabling pupils to discuss their work with teachers they will be meeting in their new school. Video conferencing prior to school visits carried out by secondary staff can help to maximise the impact of the visit and place pupils' work in context. A video conference where primary pupils can take part in a secondary science lesson will help to support smooth transition. For example, arrange a video conference with a feeder primary school and use the time to introduce to pupils a scientific challenge to see whether they can explain what the best type of

sole for a trainer is to play sports in a hall, on tarmac or on grass. Pupils would then bring their work with them to their first science lesson that would be based around this work. Even if primary pupils move to different schools this type of project will provide invaluable information about a pupil's skills and attainment for their new teachers.

**Practical and investigative work.** Video conferencing between schools at Key Stages 2 and 3 can be used to develop pupils' investigative skills through sharing approaches to common investigations. Pupils carry out the same investigation at different sites and then compare approaches and results. Sharing data can provide more meaningful results, while presenting and listening to reports can help pupils develop evaluative skills.

This type of activity can often provide a positive context for working with schools abroad, including the use of MFL work. For example, a Key Stage 3 practical investigation that looks to evaluate the absorbency and strength of different types of kitchen towel can be shared between different schools, allowing pupils to discuss techniques, critically review methods and share data and evaluations. The benefit of the video conference is in helping to develop pupils' verbal communication and presentation skills, which will help to develop their written reporting for future investigations.

**Supporting specialist courses.** Specialist, limited entry GCSE and A level courses such as electronics and astronomy, as well as AS and A2 modules such as medical physics imaging, human genetics, particle or astrophysics can be supported through video conferencing links to other schools, FE and HEI. For example, arrange a video conference between A2 students studying an astrophysics module and a local university department to discuss current understanding on the physics of the early universe. The A2 students will have identified a number of questions on this area of work that they would like to have explained and emailed these in advance to the university physics department.

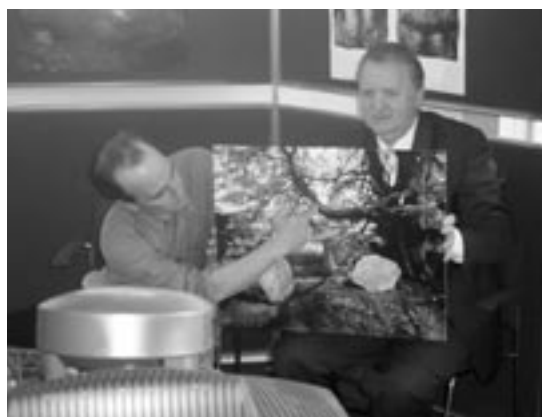
**Science projects and events.** School participation in projects such as 'Researchers in Residence' or in activities such as National Science Week can be supported by video conferencing links. For example, two schools could arrange a video conference link between Key Stage 3 pupils during science week to share productions of short plays written and performed by pupils to illustrate the work of famous scientists.

**Science clubs and enrichment.** Links between science clubs can help to stimulate new ideas and provide a wider audience for pupil interests, for example speakers can be shared, activities can be reported and competitions can be set-up. Groups of Gifted and Talented pupils can be supported and challenged through links to other similar groups for discussion and debate or through links to HEI. For example a science debate on the potential values and dangers of genetically modified crops held between two groups of pupils identified as Gifted and Talented in science could lead to an article published jointly on the schools' websites.

**Teachers' professional development.** There is considerable value in links between science departments to enable staff to share ideas and disseminate effective practice. For example a video conferencing link could be established to enable two departments to discuss different strategies for teaching about particles across Key Stage 3. The discussion could focus on how teachers use modelling and analogy to help pupils understand concepts and what the key misconceptions are and how these can be addressed.

## ART AND DESIGN

Video conferencing presents art and design teachers with another possibility for extending pupils' access to a whole range of artists, galleries and museums as well as presenting an opportunity for pupils to learn new skills and processes and share ideas and evaluations.



If video conferencing in your art-room or classroom is difficult, make a set in the room you are using which reflects an art theme.

If we take the four strands of the National Curriculum for art and design and accept that these evolve seamlessly into the GCSE Assessment Objectives we can explore, through each strand, possible ways of utilising video conferencing to enhance the delivery of art and design across all key stages.

**Exploring and developing ideas.** For instance, you could link with another school doing a similar unit of work. Pupils from each school could show each other their own drawings or starting points that are special to themselves or their own environment. This would work well with landscapes or the built environment. How about a city school linking with, say, one that sits on the coast? The pupils might negotiate and discuss starting points or compare ideas and experiences to help plan a piece of work. They could ask each other questions and discuss how they've developed their ideas, comparing and contrasting different approaches.

**Investigating and making art, craft and design.** For instance, your school might invite an artist, craftsperson, designer or specialist teacher to demonstrate particular skills or techniques to pupils from your own and other schools via video conferencing. It might be possible, for example, to compare the techniques of several different specialists exploring a similar theme. Pupils would then practise and apply their learning over a period of time before presenting their efforts back to the specialist. This would be particularly useful for exploring new techniques that maybe the teacher is unfamiliar with such as felt-making, clay-work or silk painting. Video conferencing is a great way of sharing your experiences with other groups

**Evaluating and developing work.** Comparing and sharing evaluations of their own and other people's work. For example, pupils following a similar theme or unit of work could exhibit their work and discuss their own outcomes, commenting on specific aspects. This would provide a real focus for their evaluations and would require quality preparation time and probably the use of writing frames. The pupils' own presentation and questioning skills would need to be developed, including the use of the voice, eyes and body. Such presentations could take place on a regular basis with the same schools giving all pupils, over a period of time, the opportunity to present to a live audience. There might be scope for a sort of 'Artist Idol' activity with pupils from linked schools eventually voting for an overall winner!

**Knowledge and understanding.** This is probably the most obvious area where video conferencing can make a difference. Many galleries and museums across the world now have facilities for this type of activity. So if you are looking at the work of a particular artist, theme or movement then why not track down the gallery or museum with the type of examples that

you want and let their expert or education officer do the work! For instance, schools can link to experts at the National Portrait Gallery for sessions that include both art and history across all key stages. Sessions from the Imperial War Museum look at propaganda through art, including a study of posters and a practical session where the pupils produce their own historical caricature. All bookable on [www.global-leap.com](http://www.global-leap.com) by registered schools.

## CITIZENSHIP AND PSHE

Students being able to talk with others is a key element in PSHE and citizenship. A lot of the video conferencing ideas in other subject areas will also have significant impact on PSHE and citizenship.

To enhance students' understanding about their own communities, and how they can influence both what happens within those communities and be supported by them, is also a key task of citizenship education. Sharing those ideas with students in different kinds of communities adds even greater value. The following are some suggestions for using video conferencing to do this.

**At Key Stages 1 and 2** schools are required to spend five per cent of their time delivering a PSHE programme. This needs to include work about belonging, relationships, choices, care of the environment, growing and changing, citizenship and healthy living. Video conferencing can support this work in all sorts of ways with opportunities for staff and children to share details of aspects of their school's delivery of the programme which they particularly value or enjoy.

**School Councils - Key Stages 1-4.** Many schools have effective school councils or are wanting to set them up. School councils take on a range of issues and are an effective way of giving young people responsibility and ownership of their school. Video conferencing between school councils and sharing the ways school councils work and the issues they have tackled across different parts of the country can help young people gain an understanding of those from different cultural and social settings.

**Health Education - Key Stages 3, 4 and 5.** One of the skills young people need is how to access health clinics as well as the GPs in their own locality and when they are away from home. Sharing their experiences of doing this is an important way for young people's voices to be heard. Your pupils may have a health forum at school which has enabled them to influence local health provision, and they may well have experiences to share of good or bad support they have received. Video conferencing can provide the opportunity for young people in different areas to discuss and debate issues such as drug use/misuse, sexual health and general health issues and could help lead to improved services for young people.

It may also be possible to set up links with health professionals. Many hospitals have video conferencing facilities for their own training and educational purposes, which they may be prepared to use to link with schools. Sessions can be arranged through [www.global-leap.com](http://www.global-leap.com), for instance, to link with professionals from Queen Elizabeth the Queen Mother Hospital, Margate, to look at health issues and careers in the health service.

**Citizenship - Key Stages 3-4.** Political literacy. Taking a pro-active approach in local issues is to be encouraged through the citizenship curriculum. Young people are rightly proud when they have had an influence on decision making in their locality and there are many good examples of young people contacting their MPs or local councillors about issues of local, national or international concern. Video conferencing offers the opportunity of sharing how this has been done as well as sharing what has been of concern with others in other parts of the country. It also offers support for the political literacy agenda.

**Links with Politicians.** As well as student discussion, there is a real opportunity here to invite a local councillor, MP or MEP into your school to take part in a video conference and share their knowledge and expertise on a particular issue with you and your partner school. Another option is to arrange to conference with an MP either in a school in their own constituency or a location in London.

You could also include a link to a school in another part of the world to highlight and discuss different perspectives of the same issue.

**Global Citizenship.** A willingness to learn from others around the world and increasing the motivation of young people to affect change are just two of the underlying principles of Global Citizenship. The potential contribution of video conferencing to active Global Citizenship is clearly enormous. Possible topics which pupils in partner schools might explore together as a means of highlighting lifestyle similarities and interdependence might therefore include:

- 'A day in the life of' presentation
- A comparison of distinctive cultural ways of life such as religious festivals, toys, the use of leisure time, diets or popular music.
- People in each other's community or country who have worked for equity and social justice and why.
- Issues such as trade, refugees or global warming which highlight the need for collaboration and a collective perspective on a global scale.
- Involving a politician or representative of a national Charity or Aid organisation
- World Health issues including HIV and Aids

## DESIGN AND TECHNOLOGY

There are many aspects of design and technology that lend themselves to video conferencing as the subject is very much about doing things through designing and making and then communicating these ideas to others.

**Key Stage 1.** The activities in Key Stage 1 include teaching a range of focused practical tasks, investigation and analysis of products. Pupils can examine a collection of products related to their particular design and make assignment and come up with a range of statements based on Key Stage 1 product analysis questions. They are designed to draw pupils' attention to:

- the properties and qualities of materials
- technical vocabulary
- consumer preferences
- the idea of fitness for purpose and that designs might be changed.

These are then explored through their own designing and making.

Some examples of questions for KS1 pupils are as follows:

- Who has seen one of these products before and where?
- How do you use the product?
- Is it easy to use?
- What are the correct names for these products?
- What are the names of the types of materials used in these products?
- Why have the materials been used?
- How have the different parts been joined together?
- Is it safe to use?
- What words can be used to describe the shape, colour, feel, and taste?
- What might we have to do before we can use the product, e.g. put in a battery, switch it on, open it up, wash it, and peel it?
- How does a product move and what mechanisms are required and in what direction?

You could develop your own set of cards for each product analysis that uses a range of the questions above which relate specifically to the set of products you are evaluating. You could then present your findings, via video conference, to another class in a partner school where pupils are analysing the same or different types of product. They could do the same to your group and you could compare your findings.

**Key Stage 2.** At Key Stage 2 you need to consolidate knowledge and skills acquired during Key Stage 1 but to also extend the children's capabilities and confidence in designing. Designing is about taking decisions and making choices within the constraints set out by the specification or project criteria. To develop pupils' ability to talk about designing is fundamental to their designing development. Set the children the task of coming up with a range of solutions to the project set and discussing their design decisions with a design 'partner' using video conferencing.

There is the added bonus of being able to show visual information to the partner, and the partner, who could be an older pupil from another school, could give constructive feedback on their design choices.

This will mirror the presentation and discussion sessions that successful designers use to liaise with their clients. Pupils will need to design and label clearly drawings for their intended audience using whatever graphical techniques necessary. They will also need to learn how to make the best use of the camera facilities on their video conferencing system so they can show designs to their partner during the video conference session.

**Key Stage 3.** Student work becomes increasingly complex at Key Stage 3, involving computer-aided design and computer aided manufacturing techniques. Video conferencing can support this activity by linking with a centre with CAM facilities and enabling the students to watch their designs being made. This is particularly useful when schools haven't the capacity to make a large number of individually designed items for a whole class and the design work carried out on Techsoft 2D designer or Pro-desktop software can be manufactured at the local FE college or technology college hub.

**Key Stage 4.** Part of the GCSE coursework and examination in design and technology is to show an understanding of industrial practices.

It would be ideal to make a video conferencing link to a work place where students could interview an employee to find out information for their project work. Students would, of course, need to research and prepare in detail for the link.

Increasingly multimedia approaches are being found in design and technology coursework, so a video of the link could be produced as 'evidence' of research, and the information gathered could be used to develop a product design specification to a high level. Students could then produce a specification and some initial ideas, which could then be shown and discussed through the link and feedback given to support the student with the industrial perspective.

**Key Stage 5, AS and A level AVC.** Students at this level have to understand a range of industrial manufacturing techniques, so a video conference link with a manufacturer which enabled them to watch and discuss some of these techniques relating to their design proposals would expand their knowledge considerably. It would also be beneficial for them to have a 'mentor' from an industrial background. A video conferencing link with a mentor would enable the student to show and exchange ideas and to prepare for future meetings.

## GEOGRAPHY

Video conferencing can provide an exciting and highly motivating means for pupils, of all ages, to carry out studies of contrasting localities both within the UK and overseas.

- For example, at Key Stage 1, pupils at an urban primary school might compare, through digital photographs, oral descriptions and virtual fieldwork via video footage, the vicinity of their school with a partner institution in a more rural environment.
- Later, at Key Stage 2, this could be extended to enable pupils to compare and contrast their locality with the locality of a partner school in a less economically developed country. Here, clearly defined headings such as 'Jobs', 'Shops', 'Transport', 'Pollution', etc., requiring a period of research in preparation for reciprocal presentations during a number of video conferencing sessions, might be used to focus the study.
- At Key Stage 3 pupils could use video conferencing sessions with a school overseas to explore the theme of 'Development'. For example, the exchange of key social and economic indicators such as life expectancy, television ownership, the number of patients per doctor, etc could be the starting point for examining the effects of differences in development on the quality of life of different groups of people.

## EDUCATION FOR SUSTAINABLE DEVELOPMENT

Video conferencing provides tremendous scope for pupils to explore environmental issues together, particularly the idea of sustainable development, recognising its implications for each other's lives.

- For example, pupils in two schools might make a presentation to each other about the implications of an environmental change occurring locally such as the construction of a by-pass, deforestation or attempts to develop alternative sources of energy.
- To encourage pupils to think about how they might live in a more sustainable and less wasteful way, video conferencing could be used to enable children to compare relative amounts and types of rubbish from households in the UK with households in other countries.

- Similarly, pupils could compare the patterns of their journeys to and from school and use the outcomes as the basis for exploring the issue of sustainable transport systems.

## HISTORY

There are many aspects of the history curriculum which can benefit from video conference links with other schools as well as links with experts.

**Local history.** When studying local history at Key Stage 2 or 3 (1750-1900) or at GCSE, two or more schools could prepare a presentation for another school from a contrasting locality. Presentations at Key Stage 2 could be on “Local Heroes”.

Alternatively, each school could prepare a “Detective work” pack of resources about its own area and send it to the partner school, challenging the pupils there to work out as much as they can about the partner school’s locality. The video conference would present and follow up the findings.

**Interpretations of history** offer a rich vein for video conferencing. Schools could be asked to prepare one view of an historical event or person while another school prepares a contrasting viewpoint. The video conference would involve presentations with question and answer followed by a “free vote” of all pupils about which interpretation they think is most convincing. Possible questions include “Was there really a Blitz Spirit?” (Key Stage 2), “Bad King John?” (Key Stage 3), “Has Pasteur’s contribution to medicine been overrated?” (Key Stage 4)

Balloon debates where different pupils from different schools argue the significance of different characters in history are also possible.

With sensitive handling it may even be possible to explore how different nationalities teach events of common interest, e.g. the French Revolution, the Cuban Missile Crisis or Civil Rights.

“**Triumph shows**” could be arranged where pupils present to another school their recent work in history (or teachers share teaching ideas). Cross-phase presentations could be made, e.g. secondary pupils studying the “Break with Rome” by Henry VIII (Key Stage 3) could be challenged to lead a presentation about this complicated issue for pupils in Key Stage 2.

Variations on “**quiz shows**” could be arranged. Teams from two schools at Key Stage 2 could collect some obscure artefacts and prepare “Call my Bluff” style definitions for the other school to choose from.

**Links with experts.** Finally, there are many museums and galleries that now offer video conferencing programmes, many of which have been developed with direct support from ‘The Video Conferencing in the Classroom Project’. For instance, The National Portrait Gallery offers “Growing up in the Past” for Key Stage 1 and “Tudors and Victorians” for Key Stages 2 and 3. The National Maritime Museum offers a Key Stage 1 session called “Trim the Cat”, storytelling about the real adventures of Trim, ship’s cat and friend of the 19th-century British explorer, Matthew Flinders, as well as a Key Stage 2 Tudors and Vikings session. The Tower of

London offers a whole range of sessions including one about “Charlie the Raven” for Key Stage 1, Elizabeth I and Cavaliers and Roundheads for Key Stages 2 and 3.

There is also a range of sessions available from The Imperial War Museum, The National Archive and the Cabinet War Rooms.

Details of these sessions and others are on [www.global-leap.com](http://www.global-leap.com) and can be booked by registered schools.

In time, it may be possible for pupils to hold video conferences with other “experts” such as text book authors, examiners or coursework moderators. Push at the boundaries!

## MODERN FOREIGN LANGUAGES

One of the greatest impacts of a video conference link with another country is its capacity to make a language come alive and to bring its real use directly into the classroom.

The relevance of learning a foreign language is sometimes questioned by young people. Many classroom activities fail to engage their interest since they lack a real audience and a real purpose. But when they come face to face with young people from France, Germany, Spain, Italy, Japan or other countries around the world wearing similar fashions, interested in the same sports and the same music as themselves, the language suddenly becomes entirely relevant.

The urge to communicate takes over, just as it does during a school exchange, but through video conferencing such an experience can be a regular part of classroom learning.

As well as helping to improve language skills, video conferencing also provides excellent opportunities to develop the pupils’ cultural awareness, an essential part of the MFL National Curriculum programmes of study, often difficult to deliver in the everyday classroom; for example by enabling pupils to:

- communicate with native speakers (4b)
- compare their culture with others (4c)
- consider the experiences and perspectives of people in other countries (4d)

Here are some ideas to use in the MFL classroom.

**Interviewing. Key Stage 2.** At the end of unit one, in the text book *Equipe 1* there is an interview activity - set up a video conferencing link and use your partner class to be the interviewers and interviewees. The book even provides prompts for the children’s questions. It may be necessary to carry out the activity in lunchtimes, in which case it is a good activity for pairs of children. As confidence grows, the children can supplement the questions with whatever they happen to be covering in class at the time. Such links have a long shelf life because the partnerships vary each time you link and the exercise has the feel of a “chatroom”.

**Talking about traditions throughout the year.** Bring along artefacts to do with a festival - for instance Easter, Harvest, Valentine’s Day or Christmas, which is a good one to start



with. Arrange the mince pie, Christmas pudding, carrot, glass of sherry, cracker and other artefacts on a table and pre-set the camera positions to show them during your presentation. Prior to the conference, prepare a written description in English and the target language of what will be said during the presentation and e-mail it to your colleague abroad so that the vocabulary can be introduced prior to or after the conference, depending on the group. Your colleague should do the same for their artefacts. Each class, working in groups, then presents their artefacts in the target language.

There is a number of permutations: your partners' presentations could be in their own language, if you want to focus on listening skills for the group watching, or in the foreign language if you wish your own pupils to practise this.

After the presentation, there is the chance for a free discussion about different traditions, with teachers assisting comprehension where necessary.

**Presenting information about yourself.** Pupils prepare a collage of their family, hobbies, pets, bedroom and so on and present it to their partner/s. There are a number of ways of doing this:

- The students can hold the collage up in front of the camera as they speak.
- The collage can be put on a stand or pinned to a notice board and the camera can zoom in on the various component parts - and cut back to the speaker as necessary (or not if the speaker is shy!). The speaker can also use notes in their target language without them being seen. The collage could also be copied, reduced, scanned and emailed for discussion afterwards.
- The collage could be compiled entirely electronically using a graphics programme and emailed to the partners in advance.
- The pictures could be taken on a digital camera and shown to the partners as the student is talking, if your video conferencing system has this facility.

Whichever method you use, the students will still be developing confidence and self-esteem!

**Giving a presentation about your school using video, digital pictures and/or Powerpoint.** Over the course of a few lessons, prepare information about your school in the target language and illustrate it either with video or digital pictures. You can either link the video or pictures directly to the video conferencing system (see Section B for more information) or put them into a Powerpoint presentation and include text and graphics too to enhance the presentation.

Link a laptop to the video conferencing system and pupils can make their presentations, singly or in groups, to their partners, talking in the target language. Again, speaking with aid of visuals helps minimise any embarrassment, consolidates learning and gives a purpose to all that GCSE preparation!

**Friendship links.** Set up a drop-in club at lunch time along the lines of an internet café so that pairs of students can conference freely as they choose. Prepare the way by exchanging I.D. cards and letters in the target language via e-mail. Consolidate with a face-to-face video conference.

### **Asking and answering questions in the target language (Key Stage 3 and 4).**

This activity can be done with partners in European schools, other UK schools and even, if you have two video conferencing systems, between different classes or two groups from the same class in your school. Using video conferencing for this activity, whichever the partner school, focuses the mind hugely and, coupled with careful preparation of questions and answers as normal in the run-up to GCSE, can be a powerful revision and motivational tool.

Boys, particularly, love to try to trip each other up with a difficult question and quickly learn to ask a past tense question or demand an opinion!

E-mail questions to your European partner school beforehand and ask them to ask the questions first and then to answer for the English students, giving practice in both skills of listening and speaking.

### **EXTRA, UNPLANNED BENEFITS AND TIPS**

Trying to manage a classroom, speak to colleagues in the target language and put shy learners at their ease can be taxing. To make things easier, share the work with the pupils! Give them the remote control and the task of setting preset camera positions and operating the camera during the conference. Ask them to respect each other by setting up pairs or threes and ban close-up shots of individuals. Teenagers do not like these! This not only eases the teacher's burden but also involves learners who initially may only wish to listen rather than speak before a camera. It also creates a co-operative atmosphere in the class.

Finding times to conference with classes in European schools can be a problem given the time difference, so it may be necessary to link pupils of different ages, but this can sometimes be beneficial. For instance, a link between primary-aged pupils in Germany and Year 10 students in the UK can be successful because the older pupils feel 'obliged' to speak German to the younger children who, although only beginners in English, are still prepared to use it in front of the camera!

Video conferencing with pupils in Europe who aren't wearing school uniform can stimulate a lot of discussion about the differences between UK schools and schools abroad. This can be a really spontaneous exchange and gives an opportunity for all pupils to get involved.

**Discussing topical issues.** These conferences with partners in other countries may take place in English as the Lingua Franca, although pupils sometimes get so involved and want to put their point across that they chip in in the target language! Good topics and ones which are easy to talk about might be:

- The Royal Family - do we need them?
- War is sometimes necessary.
- All pupils should wear a uniform
- How do others see us?
- "What Challenges You?"
- HIV and Aids
- Being a refugee
- International political issues

For these, as with other conferences, preparation is essential - brainstorming discussion points and identifying key words in the target language. You could also exchange information about the subject with your partners beforehand - photographs or drawings, perhaps. For a discussion about stereotypes, for instance, you could send images of what you felt was typically British (the Union Jack, a bulldog, The Queen, fish and chips, rain and fog) to provoke discussion. Your partners could do the same!

## MUSIC

The use of video conferencing can support many aspects of the music curriculum, notably composition and ongoing skills. There are opportunities for teachers to plan together and for students to share 'work in progress' and perform to one another. Here are some suggestions of how video conferencing with another school could enhance composition work.

**Composing (Key Stages 1-4).** Here's a suggestion for a series of three video conferences which would support work with a class from another school.

First, plan a stimulus suitable for the groups involved as a starting point with the other teacher, for instance, a piece of music, a style of artwork, a piece of prose or poetry, a local geographical scene, an object, activity, working model or mechanism from work in science or design and technology, or a religious story or historical event made into role play

In your first video conference share and discuss this starting point, which the pupils could go on to use as a springboard for a composition in small groups. One group could use words linked with the stimulus, another could devise rhythms, other groups could work on tuned and untuned percussion. A group could use instruments they play outside of school, another could use software.

The second video conference could be a 'work in progress' session. The various groups play what they have got so far. Each group at School A listens to one group at School B. This ensures some quality listening and quality peer assessment, with helpful comments about how to continue the work. Work then continues on completing the composition.

Before the final conference the pupils should design a programme and email it to their partners.

The final conference will be Performance Day. The two teachers will have planned an interactive performance - so the audiences in each school will experience a mixture of live performance and performance from the far-end. (NB It would be very difficult for both groups to play together because of the slight time delay!)

**On-going Skills (QCA units 1,8,15).** Here is a unit of work which includes two video conferences. Before the first video conference the class teachers would need to decide upon a repertoire to teach the children, for instance songs linked to a topic being studied in history, art, science, etc. They can also decide on some listening activities and challenges linked to learning objectives in QCA units of work.

In the first video conference, School A performs a song. School B will have been given a listening task, e.g. linked with key lyrics, or how many times a particular rhythm or melody

occurs. School B throws a challenge to School A, for instance to develop an awareness of phrase when singing this song by the next session.

School B then performs its song. School A have been given a listening task. School A challenges school B, for instance to control expressive elements by next session.

In between conferences, the class teachers work on learning objectives ready for next session plus one new song.

The second video conference would follow a similar pattern, and challenging questions will be asked. Has the old song improved? Has the other school achieved the learning outcomes? What objectives could they work on with the new song? These sessions could continue throughout the school year, extending the repertoire of songs and building up the learning objectives.

**Workshops with amateurs.** There are many ways the schools could work with amateurs. They could work solely in one school or base their work at School A for session one and then at School B for session two. This would need a detailed planning meeting between the class teachers and the musicians before the sessions. Many of the ideas mentioned above could be adapted for these sessions.

**Sharing international and traditional music.** Video conferencing also provides opportunities to share music with people all around the world. Project SAXophone International Video Conference Music Festival in Chicago is an example of schools around the world cooperating to share music. Visit [www.vceducation.org/music.html](http://www.vceducation.org/music.html) to find out more.

You could also set up your own sessions sharing music with partner schools in different countries.

## PHYSICAL EDUCATION

The ability to link groups of teachers, pupils and students by video conference provides physical education teachers with opportunities to enrich both the teaching and learning in the subject and also bring teachers together more frequently to discuss key aspects of subject development.

**Collaborative work.** Within 'A' level teaching there are significant advantages of sharing expertise with groups of students in different colleges. On-line discussion and debate have enabled students to consolidate their thinking and establish their understanding. Video conference links between students following the same course would be a more effective way of doing the same thing.

A good task for "A" level students would be to set up specific conference links to help with revision tasks. Many video links can be kept short, and built into lessons, seminars or key lectures to help pupils to scaffold information and make sense of complex issues.

**Links with key professionals.** It would also be beneficial to set up links with key professionals in the sports medicine, sports development and national governing bodies and even professional sports men and women. These sessions could help to engage pupils and give

them access to people who have particular expertise or views to share. The opportunities are endless.

**Management issues.** A further application of video conferencing in physical education and school sport is seen where rural School Sport Coordinator partnerships work on line to manage key management issues and to share best practice across a large county. The Partnership Development Manager can keep in touch with his/her 12/13 school sport coordinators on a regular basis using a simple video link with the team. This saves valuable travel time and keeps meetings prompt and highly focused. As the National Strategy for School Sport Coordinators managed through Sports Colleges develops, remote management and isolation within the job remain challenges that can be over come with video conferencing technology.

## RELIGIOUS EDUCATION

The use of video conferencing in religious education offers the opportunity for pupils to embed their learning about religion within the real world of faith communities, to extend their understanding by discussing issues with peers in other schools and localities and to contribute to their spiritual, moral, social and cultural development.

### **Establishing links with members of faith communities.**

It is valuable for pupils to be able to speak to adherents about religious beliefs and practice when representatives of a particular faith are not easily available in a particular region. Video conferencing can provide this opportunity. Individual schools can arrange contact with people who base their lives on religious principles. Your religious education adviser will have contacts with speakers from each of the principal religions of Britain who could appropriately address pupils' enquiries. A priest or an imam could be invited into a local school or CLC and link to schools in other parts of the country. Such an exercise goes well beyond any experience that can be gained from reading a book or watching a video. It is live and is the next best thing to inviting the visitor into the classroom. The questions of the pupils and the precise learning objective can be addressed. This method can be used in religious education at any key stage.



**Multipoint events.** If you want to share a link you have established with another school, you can establish a multipoint conference (involving more than two participants). It is often more convenient and efficient in terms of time and other cost. For information about setting up a multipoint conference, see Section A.

**Collaborative work.** Some schools have established links with schools in other parts of the country where there is greater diversity represented in the classroom. Such a situation gives a new and valuable dimension when studying a religion not well represented locally. It is important in these circumstances that it is of mutual benefit to both parties and that there is giving and receiving on both sides.

Providing the opportunity for pupils to meet and work with members of faith communities, especially of their own age, results not only in greater knowledge and understanding but also

in the development of respect for other people's beliefs and values and the social skills that are necessary. It contributes to the recognition of the diversity within religions and avoids the danger of stereotyping. It offers a valuable opportunity for well-grounded, enquiry-based learning.

Almost any unit of work in religious education would benefit from links with the wider community through video conferencing. If local visitors or other resources are not available, the use of video conferencing will enhance the learning. Teachers of religious education in community and voluntary controlled schools have to base their planning and teaching on their local agreed syllabus. Those in voluntary aided schools use the documentation approved by their governors. See Appendix 3 at the end of this section for a list of potential activities linked to the QCA scheme of work. These should be adapted to meet the requirements of the local agreed syllabus or other defining documents.

## LINKS WITH EXPERTS

The opportunity to bring experts from all over the world into the classroom is one of the real strengths of video conferencing.

The 'Video Conferencing in the Classroom Project' (Museum and Gallery Programme) offers sessions bookable via [www.global-leap.com](http://www.global-leap.com).

Some other museums may have their own booking systems. Check their websites for current availability and costs, if applicable. Most of these providers will want to plan forthcoming sessions with the teacher, discuss preparations and make any necessary adjustments to suit specific requirements. Teachers will need to make their own judgements about the suitability of the sessions offered.

## THINGS TO THINK ABOUT WHEN SETTING UP A VIDEO CONFERENCE LINK

### 1. Exactly what do you want your students AND those they are linking with to learn?

- What aspects from the programmes of study or syllabus?
- What PRECISE learning objectives do you want them to achieve?
- What are the questions that all involved in the conferencing will be answering?

### 2. How does video conferencing particularly enhance their learning and understanding?

- Could you add to their learning by using other technologies in conjunction with video conferencing - email, for example?
- What are the specific learning outcomes for those who participate in the conference?

### 3. What classroom preparation will you need to do with students in advance so that they get maximum learning benefit from the video conference?

- Do they need to brainstorm questions to ask other students - in which case what makes GOOD questions?

- Do they need to research and prepare materials for students with whom they are conferencing? Can you take this opportunity to teach important research skills?
- Do you need to prepare and send any advanced materials to the students at the far-end? There may be particular value in sending out information, photographs, video footage or PowerPoint presentations about a particular theme in advance so that video conferencing time can be spent in actual DEBATE about the topic under review.

#### **4. During the actual conferencing what specific learning activities will students involved in the conference be doing?**

- Will they be listening to other students talking and making notes on particular aspects of the topic? If so, what recording grids will they be using? Will they concept map what they hear?
- Will they be participating in actual debate about an issue? If so, how will it be organised?
- Will they have their own notes?
- Have they had the opportunity to practise a real debate before the conference? There is a wealth of useful material about active speaking, listening, debating and note taking in the Key Stage 3 National Literacy Strategy 'Literacy across the Curriculum' folder.

#### **5. After the conference what follow up activities will you do with students to consolidate their understanding?**

- What do they do with what they have just learned from other students via conferencing?

Good use of ICT in a subject involves well-planned follow up activities back in class which use the materials obtained via ICT!

## **SPECIAL NEEDS**

### **'Outside in' - inclusion and pupils with a range of abilities**

Video conferencing is a technology that can bring pupils into a classroom when, for a variety of reasons, they are unable to attend class in person.

This concept has for a long time been on the 'wish list' of teachers working to develop a truly inclusive curriculum. The practice of individuals or groups of pupils being able to join mainstream lessons in local schools is already happening in some areas and could be a reality for numbers of pupils around the country isolated from the mainstream classroom through illness, special educational needs or other special circumstances.

Teacher assessment also recognises that pupils with a variety of abilities within mainstream schools will benefit from regular video conferencing activities brought directly to their classroom. Increased pupil motivation has been identified as a major benefit, but research has also demonstrated additional benefits connected with language acquisition and other speaking and listening skills. These skills are transferable, adding value to lessons not directly related to the video conference activity or lesson.

A study of children with special educational needs, by teacher Maria Penicud and speech therapist Karen Bamford in May 2003 at Arbour Vale School, Slough, indicated that video conferencing has the potential to develop communication skills in pupils and increase their enjoyment of lessons.

Using it as one of a range of educational tools will mean developing the appropriate expertise and management of this new technology within a school. The gains made in pupils' clarity of speech, intelligibility, vocabulary size and enjoyment in lessons all point to a need for all involved in education to consider the use of video conferencing in their schools.

The opportunity for collaborative learning between schools is important if schools wish to develop communication skills. Indeed, in Arbour Vale School video conferencing is now also scheduled for use in the post-16 department to develop communication skills and support for the Citizenship curriculum.

*Taken from research developed by Maria Penicud*

Pupils should have access to the full curriculum from their isolation ward, their home, their detention centre or special unit, and video conferencing does offer a solution, enabling children to interact with their peers from a distance.

Teachers and therapists in special units can also experience a sense of isolation from colleagues, which video conferencing can go some way towards relieving. Working with colleagues and sharing experience are vital for professional development. Sharing and developing knowledge, skills and expertise through conference, seminars and in-service training are standard practice. The profession now has an opportunity to develop this interaction and skill sharing beyond the formal gathering, to enable teachers to work in teams and share skills in a way that would not have been possible just a little time ago.



Science	History	Geography	MFL	Art & Design	Design & Tech.	RE	Citizen./PSHE	Music	Other
							KS1		CPD
							FC		
KS1									CPD
KS2									CPD
						KS2	KS2		
		KS3				KS3	KS3		
							KS4		
	(US)						(US)		
		KS3							
KS1-2							KS1-2		
			KS3				KS3		
			KS3						
			KS5						
			KS4-5						
							KS5		KS5 Key Skills, Leisure & Tourism
							KS2&3		KS2&3 Cross-phase links
							KS2/5		KS2&3 Cross-phase links
KS2-3									CPD
			KS2&4						
			KS3-4						
KS2					KS2				
KS1-4									
								Gr. 1	
									KS5 External Tutors
									GCSE Latin
KS2									
KS2									
KS2									
	KS3								
KS2-3	KS2-3						KS2-3		
KS4-5		KS4-5							
KS3									
		KS3							
KS2									
		KS3							
							KS4		
				KS2/4					
						KS3	KS3		

## APPENDIX 2

These are suggestions of some **National Literacy Strategy** objectives which could be enhanced by the use of video conferencing. It is not intended to be an exhaustive list and there are many more opportunities which could be exploited.

	<b>Performance and follow-up</b>	<b>Working collaboratively - comparing and contrasting, discussion and argument</b>	<b>Gaining access to different cultural contexts</b>	<b>Gaining access to experts and research</b>
<b>Year 1</b>	<b>Term 1, T3</b> retelling stories <b>Term 1, T6</b> to recite stories and poems;	<b>Term 1, T5</b> to describe story setting and incidents and relate to own experience and that of others;		
<b>Year 2</b>	<b>Term 1, T6</b> to discuss familiar story themes and link to own experiences; <b>Term 2, T5</b> to discuss story endings;	<b>Term 3, T4</b> to compare books by same author; <b>Term 3, T7</b> to compare books by different authors;		
<b>Year 3</b>	<b>Term 2, T4 and 5</b> prepare poems for performance. Rehearse and improve;	<b>Term 2, T10</b> to write alternative sequels to traditional stories;		
<b>Year 4</b>	<b>Term 1, T5</b> to prepare, read and perform playscripts;	<b>Term 3, T16</b> to read, compare and evaluate examples of arguments and discussions; <b>Term 3, T17</b> how arguments are presented; <b>Term 3, T18</b> investigate persuasive writing; <b>Term 3, T19</b> to evaluate advertisements;	<b>Term 3, T2</b> to read stories from other cultures;	<b>Term 2, T16</b> prepare for factual research; <b>Term 2, T23</b> collect information from a variety of sources;
<b>Year 5</b>	<b>Term 2, T5</b> to perform poems in a variety of ways;	<b>Term 3, T14</b> to select and evaluate a range of texts for persuasiveness; <b>Term 3, T15</b> to collect and investigate use of persuasive devices;	<b>Term 3, T1</b> to investigate a range of texts from different cultures;	
<b>Year 6</b>		<b>Term 1, T3</b> to articulate personal responses to literature; <b>Term 2, T18</b> to construct effective arguments; <b>Term 3, T1</b> to describe and evaluate the style of an individual writer;		

These are suggestions of **Key Stage 3 National Strategy Framework for Teaching English** objectives which could be enhanced by the use of video conferencing. It is not intended to be an exhaustive list and there are many more opportunities which could be exploited - many of the writing objectives, for instance, could be addressed collaboratively.

	<b>Performance and follow-up</b>	<b>Working collaboratively - comparing and contrasting, discussion and argument</b>	<b>Gaining access to different cultural contexts</b>	<b>Gaining access to experts and research</b>
<b>Year 7</b>	<b>Understanding the author's craft: 12</b> Character, setting and mood <b>Speaking: 2</b> Recount	<b>Speaking: 5</b> Put a point of view <b>Listening: 6</b> Recall main points <b>Group discussion and interaction: 10</b> Report main points <b>11</b> Range of roles <b>12</b> Exploratory Talk <b>13</b> Collaboration <b>14</b> Modify views <b>Drama: 19</b> Evaluate presentations		
<b>Year 8</b>	<b>Speaking: 2</b> Develop recount <b>3</b> Formal presentation <b>4</b> Commentary <b>Listening: 7</b> Listen for a specific purpose	<b>Group discussion and interaction: 10</b> Hypothesis and speculation <b>Drama: 16</b> Collaborative presentation	<b>Study of literary texts: 16</b> Cultural context	<b>Research and study skills:</b> <b>1</b> Combine information <b>2</b> Independent research
<b>Year 9</b>	<b>Speaking: 2</b> Standard English <b>Drama: 12</b> Drama techniques	<b>Reading for meaning: 7</b> Compare texts <b>Understanding the author's craft: 9</b> Compare writers from different times <b>10</b> Interpretations of text <b>12</b> Rhetorical devices Study of literary texts: <b>17</b> Compare poets <b>18</b> Prose text <b>Speaking :3</b> Interview techniques <b>Listening: 5</b> Compare points of view <b>Group discussion and interaction 9</b> Considered Viewpoint <b>10</b> Group organisation	<b>Study of literary texts: 16</b> Different cultural contexts	<b>Research and study skills: 1</b> Information retrieval

# APPENDIX 3

<b>KS1</b>	
Unit 1E How do Jewish people express their beliefs in practice?	Interview a Jewish person about Hanukkah - have the hanukkiah lit, see a range of hanukkiot
Unit 1E How do Jewish people express their beliefs in practice?	Invite a Jewish family to set up a Pesach table, explain it and role play part of the meal (e.g. the four questions)
Unit 2D Visiting a place of worship	Arrange for a video conferencing unit to be used in a place of worship not represented in the local community
<b>KS2</b>	
Unit 5B How do Muslims express their beliefs in practice?	Arrange an 'ask the imam' session
Unit 4A How do Hindus worship at home and in the mandir?	Invite a Hindu to demonstrate arti in front of a shrine, sing Bhajans and answer pupil questions
Unit 6F How do people express their faith through the arts?	Link with a gallery or museum to be shown some of their relevant exhibits with a commentary from an expert
<b>KS3</b>	
Unit 7B What does justice mean to Christians?	Interview a Christian Aid representative about their work
Unit 7D Who was Gotama Buddha?	Interview a Buddhist monk at the vihara about the impact of the Buddha
Unit 8D How do the beliefs of Sikhs affect their actions?	Interview a Sikh about the meaning of equality
Unit 8F What makes a gurdwara special?	
<b>KS4</b>	
Arrange a debate with a class in another school on a moral issue as preparation for an examination question	
<b>KS5</b>	
Arrange a sixth form conference on the same day as another school and invite a speaker to address the students	
<b>At all key stages</b>	
Classes studying the same unit show each other their current work, exchange ideas and develop their work. An end of unit quiz based on a TV quiz show could be an interesting summative assessment.	

**SECTION D:**

# Making Contacts with other Schools, Providers, Experts and International Links



Whatever your situation, there will be a time when you need to find someone to video conference with. So how do you go about making contacts?

## THE GLOBAL LEAP WEBSITE

The DfES 'Video Conferencing in the Classroom Project' was set up to explore the potential of this communication tool, to facilitate pilot projects with a range of schools and providers, and to share good practice and advice with colleagues across the UK through training, conferences, written information, and direct support to individual schools. One part of the project was to develop [www.global-leap.com](http://www.global-leap.com) as a resource for teachers wishing to develop the use of this powerful communication tool across the UK, and internationally.

### THE WEBSITE INCLUDES:

- **A directory of schools** across the UK and internationally with video conferencing capability wanting to develop video conferencing in their classrooms. Any school in the UK or Internationally which can make a successful video conference connection can register their details on the Global Leap directory, and then take part in the project activities and receive regular newsletters and information from the project.
- **A monthly programme of video conferencing activities and events** which are offered to schools by a range of colleagues and providers taking part in the project. These lessons can be booked on line. The number and range of these activities and events are growing all the time. If your school has a particular area of expertise, for example an advanced skills teacher or experience in a particular area of special needs provision, that they would like to share with colleagues and pupils in other schools via video conference, please send details of your sessions to [global-leap.com](http://global-leap.com) so that other interested schools can see what you are offering and link up with you. Customised sessions can also be posted on the events pages for other schools to sign up to.
- **Contact details of video conference activity providers** around the world who deliver interactive lessons directly into the classroom. Some have off-the-shelf sessions ready to deliver, some are prepared to customise these sessions to suit your specific requirements and some may be interested in taking part in joint projects.  
**NB** Global Leap has not worked with all of these providers. It is the responsibility of each school to assess the quality of the provision offered and its relevance to the National Curriculum. Please note that some providers charge for their video conference events.
- **Information and tips** on successful video conferencing
- **Information and contacts** for other projects
- **News on related projects** - schools can also share their own project successes and ideas with other colleagues through the website and find partners to work with, both here and abroad.

- **Links to other useful websites.**
- **Technical advice and support**, on request and by arrangement.
- **Professional development and training**, by arrangement; either via video conference to your school or, if enough notice is given, a personal visit might be possible.

The 'Video Conferencing in the Classroom Project' museums and galleries programme has enabled a range of UK museums to offer lessons directly into the classroom. Global Leap offers a daily diary of events available to schools registered on the website [www.global-leap.com](http://www.global-leap.com).

The education departments in our museums often only have quite small numbers of staff available to cover an extensive programme of activities for schools, including visits from school groups. However, they have identified a number of days/times to support the 'Video Conferencing in the Classroom Project'. They try to be flexible within those allocated days to meet the individual needs of schools, but at the present time it is difficult for them to arrange days and times to order. This of course may change as further funding and additional staffing become available.

Please do not expect our colleagues to rearrange their busy diaries to accommodate your class. Try to be flexible, and if necessary negotiate lesson/room changes with one of your own colleagues and make full use of the sessions as listed on the website.

## AUTOMATED TEST FACILITIES

An automated test facility offers an opportunity for you to test your video conferencing system by dialling into an 'unmanned' far end ISDN or IP address which will have a live picture or a video running.

Global Leap's automated test facility numbers are ISDN +44 (0) 0208 868 8963, or IP 80.68.35.5.

Many vendors also have their own automated test facilities, so check what facilities they offer when you buy your system.

## BEING PROACTIVE

It is well worth looking for your own experts. Many individual organisations often have access to video conferencing equipment for their own business purposes, but have simply not thought about exploiting the resource to develop relevant contacts with schools across the country.

The potential for direct input into the classroom from local and national companies and organisations is enormous. For instance, you could set up video conference sessions to discuss careers and employment, business, marketing, industry, health, local government and politics and many more topics.

If you find a successful link to support your curriculum, share it with other schools in other parts of the country. Interested organisations can offer sessions further afield to a wider audience via [www.global-leap.com](http://www.global-leap.com).

## BEING FLEXIBLE

You need to be flexible as well as pro-active to find suitable video conference links. It may require some extra detective work, but the rewards for your pupils are worth the effort. To reject a willing partner from a school in another country on the grounds that “we don’t do French on Tuesdays” is rather a short-sighted response, but unfortunately not unheard of.

## DEVELOPING EXISTING PARTNERSHIPS

Most schools will already have strong existing relationships and long-standing contacts with partner schools. Using video conferencing as a communication tool can often add another dimension to these relationships.

Sometimes it might be worth considering purchasing a second piece of video conferencing equipment which you can then lend directly to a partner school, or a number of partner schools. This is often the best option to consider if you want to set up video conference links with a school in Europe which doesn’t already have equipment, and the potential benefits can justify the expenditure.

Other useful sources of help and advice for finding partners:

- Many schools seek to form links with others in Europe by taking part in a Socrates - Comenius Project. European-funded initiatives involve schools in three or more countries linking to work on cross-curricular projects. These often involve real visits and are ideally suited to including video conferencing as part of the project. For more information, visit <http://www.britishcouncil.org/education/schools/index.htm>. You may find it useful to contact the International Education Office in Gloucester, Tel +44 (0) 1452 427 204 for advice about some of these initiatives and other sources of funding.
- Funding is possible to support a North/South Project through The Department for International Development <http://www.britishcouncil.org/education/schools/index.htm>. The International Education Office in Gloucester (details above) can give further details.
- Your Local Education Authority may have advisory staff who can give you details of any relevant international links, projects or initiatives that already exist in your area.
- Local technology colleges and associated specialist schools, through the Specialist Schools Trust, [www.tctrust.org.uk](http://www.tctrust.org.uk), are often involved in the development of curriculum video conferencing. They have contacts in the UK, Europe and worldwide.
- The Department for Education and Skills has a number of initiatives which enable schools to develop exciting projects in relation to ICT, for instance Excellence in Cities, [www.standards.dfes.gov.uk/excellence](http://www.standards.dfes.gov.uk/excellence), which could be a good starting point in your search for a partner school.

- Ten Regional Broadband Consortia are establishing Broadband technical services across geographically-grouped LEAs, where local/regional video conferencing is being promoted. See the Building the Grid website:  
<http://broadband.ngfl.gov.uk/>  
<http://buildingthegrid.becta.org.uk/index.php?loclid=143#res94>.
- Twinning groups. Your town may already be twinned with another town in Europe. These links might be a good starting point for finding video conference contacts. Contact your Local Authority.
- Using a general internet search to find contacts. Put in a search for 'your topic' + video conference + education. Follow up the results.
- Other useful sites include:  
[www.kn.pacbell.com](http://www.kn.pacbell.com)  
[www.globalschoolhouse.org](http://www.globalschoolhouse.org)  
[www.un.org/Pubs/CyberSchoolBus/](http://www.un.org/Pubs/CyberSchoolBus/)  
<http://www.schoolsnet.com>  
[www.britishcouncil.org](http://www.britishcouncil.org)  
[www.ilearn.org](http://www.ilearn.org)  
[www.globalteenager.com](http://www.globalteenager.com)

Other international websites and organisations that might be useful in finding partners are listed on [www.global-leap.com](http://www.global-leap.com).

If you find a website that might be useful, please send it to [www.global-leap.com](http://www.global-leap.com) so that it can be added to the list and share the information with other colleagues.

## SHARING EQUIPMENT

Finally, if you manage to find a contact but they do not have video conferencing equipment, they may be able to arrange to use someone else's video conferencing facility or to borrow some equipment, providing you already have suitable connectivity in place at your school.

Working together, you could try a number of approaches:

- The RBC or LEA in your contact school's area should have details of schools with video conferencing capability. One of these schools might be prepared to let you use their system. You could visit their school site with your class. Many areas have City Learning Centres (CLCs), where they would be delighted to facilitate your video conference link, by arrangement.
- Universities or higher education institutions usually have video conferencing facilities and may be prepared to make them available to your intended partner school. They may even want to join the project in some capacity.
- Video conference equipment resellers and suppliers have access to 'rooms' all over the world which they hire out to businesses by the hour. Identify and contact a video

conferencing company or reseller near you, or near your partner school, and approach them with your request. You might find that they will support your project for a reduced charge, or even free of charge. This is often the most practical and feasible solution for some parts of the world, where video conferencing technology may not be generally available in the schools.

- Local businesses may have video conferencing facilities they would let you use. Use the local press to make an appeal or approach parents who may have connections with the companies. Local businesses are an excellent source for supporting many curriculum areas with opportunities to access experts from a wide variety of people in workplace environments.

## Continued exploration and evaluation of international connectivity issues and practical and effective classroom use of video communication

*This section reflects some of the recent experiences gained by the 'Video Conferencing in the Classroom Project' working on international links. It is not intended to reflect the situation across all countries but is simply a series of snapshots. Other schools working in different places may have had different experiences.*

### Commentary

This report is an illustration of the practicalities of making successful international video conferencing links, so that it becomes possible to see and, more importantly hear clearly. It is based on personal experience and discussions with classroom teachers from different countries around the world. The examples are based on teachers' experiences and not technicians'. It is important to realise that technical expertise is not the priority in the classroom; resources need to work reliably and effectively, with little more expertise than the regular 'plug and play' knowledge of the average user.

### Japan

#### Illustration 1

Demonstration of video conferencing technology and introduction of the 'Video Conferencing in the Classroom Project' to teachers from 60 countries around the world.

- Two options were available at the venue, ISDN and 10Mb SDSL (Broadband).
- Laptop PC hardware was used with a Logitech webcam.
- ISDN tested and working.
- SDSL tested and working with no video conference firewall restrictions.
- The option chosen was SDSL using 'SightSpeed' video conference software. The connection lasted 90 minutes and both the audio and video were good.

#### Illustration 2

Demonstration of an IP broadband videophone using domestic ADSL connection to link to the UK. In this case a little technical support and knowledge was required in the first instance to put the correct IP settings into the phone, subnet mask, default gateway, etc. The call was initiated at 256K.

Technical note: The system in London was an ADSL connection with a contended maximum

downspeed of 256K. The picture was satisfactory but the audio was terrible. The call was terminated and reconnected at 128K. On this occasion both audio and video were satisfactory.

### **Illustration 3**

Domestic laptop with webcam. Link to the UK using internet-based software 'SightSpeed'. On this occasion the video image refresh was slow and the audio was unintelligible. Using the chat facility both parties cancelled the video send facility. It was then possible to complete a reasonable conversation. By using the MS-DOS command 'tracert' +IP address it is possible to identify the number of locations the packets of data has been routed through before arriving at its destination - on this occasion it was 30, so it was hardly surprising that the quality was poor.

Subsequent attempts to test a variety of systems and software have produced mixed results.

### **Queensland, Australia**

The situation in Queensland is similar to the situation experienced by schools in the UK. The example given here is a high school in Brisbane connected on the broadband network but unable to make links outside of the restricted area of the network. This particular school has chosen to put in its own SDSL communications link. The network administrator at the school had the necessary privileges to manage the firewall and make connections to other locations. The frustration experienced by this teacher when trying to link to other countries, including the UK, is partly due to the high expectations teachers have when working with communications technology.

### **Victoria, Australia**

In Victoria the distance between locations and the isolated nature mean many places within the region use ISDN connections. Although broadband in a variety of forms is being developed it seems unlikely in the foreseeable future that this means of connection will change. A concern was that the local school managers had chosen to use a system that was not very user friendly, and on occasions the technology got in the way. Video conferencing is a potentially important resource in this region.

### **South Africa**

Schools in Johannesburg are keen to bring the world into their classrooms. However, in township schools, linking directly to the classroom is not available just now and unlikely to be available in the near future. Video conferencing can be arranged with the support of local companies. ISDN is available, although the call costs makes this solution out of reach for the majority of schools unless the UK school makes the call or other sponsorship has been arranged. Connectivity is most likely to be a dial up modem which does not offer the bandwidth suitable for classroom-quality video conferencing.

### **Brazil**

Teachers from Brazil reported advanced connectivity and plenty of hardware, but with little or no training for teachers, the potential of this resource is not being realised.

### **Poland**

Limited access to ICT in the classroom. ISDN is the choice for video conferencing connection. Teachers taking part in a major European project relied on the University to provide the video conferencing equipment and the connection to their partners.

**Finland**

Although connecting using broadband is possible, the choice for classroom-quality video conferences is still ISDN. There does not appear to be a general culture of video communications. The teachers I spoke to were not aware of other schools using video communication extensively in their classrooms.

**Greece**

Schools in Greece reported a range of issues and concerns with connectivity. In the schools I visited neither broadband nor ISDN was available. The schools involved in the international project I observed relied on a local company to support their video communication activities.

**Czech Republic**

In Prague the schools' connection was ISDN. It was therefore quite easy to make a connection using a videophone. Links to the UK were easy to establish and teachers seemed impressed with the quality of the video link and the enthusiasm of their students. Teachers from other regions of the Czech Republic reported that ADSL was becoming available to them in their schools. There was a lack of knowledge, however about the possibilities and issues involved in video communications using ADSL.

**France**

Video communication is successfully being practised in several schools across France. The preferred connection in these schools is RNIS (ISDN). Over the last year the 'Video Conferencing in the Classroom Project' has worked with teachers in Rodez and Lyon, as well as providing advice to teachers attending a British Council seminar in Paris and developing a partnership between schools in Rural Lincolnshire and schools in Poitiers. ADSL is available in some regions and might be considered as a starting point in some instances.

**Germany**

Broadband connectivity is available in the schools working in the 'Video Conferencing in the Classroom Project'. However ISDN has continued to be the choice for connection because of the firewall restrictions and lack of Quality of Service available within the UK schools

**USA**

Success with ISDN and ADSL creates the conditions for a range of opportunities for links with schools in the UK. The bandwidth across the Atlantic creates the right conditions for classroom-quality connections. The choice of ISDN or broadband means that success should be achievable for a range of curriculum activities. Teachers should identify the connectivity option that works best in any particular case. I have used broadband and ISDN to different locations and have been very pleased with the results.

**New Zealand**

The schools in New Zealand use broadband to make regular video communication links to support curriculum activities. Links to the outside world are achieved by dialling through a gateway.

**Jamaica**

During the last year we have been involved in testing for projects linking UK schools to partners in Kingston and Brownstown. Godwin Junior School in Newham has been pro active in

developing a video communications link. Initially the school used the facilities available at the University of Technology in Kingston. The school purchased a videophone for Mona Heights School and funded an ISDN line. This continued to present connection difficulties. The limited success of ISDN has meant a re-think of the connection opportunities. The school in Kingston has now installed an ADSL connection. The Brownstown schools are also moving towards the ADSL solution. The telecommunications company monopoly of connectivity on the island means that ISDN and ADSL connections are relatively expensive.

### **Canada**

Schools involved in the project have access to broadband, although when joining a conference in October 2003 the choice of connection to the UK was ISDN. The schools in Labrador have broadband as their connection, but they link to the rest of the world through an ISDN gateway.

### **Alaska**

Speaking at a conference in Anchorage the link was achieved by connecting successfully using ADSL. The report from the delegates was extremely favourable.

### **Conclusions**

For the teacher in the classroom, the priority is making technology transparent, reliable, successful and easy to use. Where the chosen solution is user friendly and reliable, teachers will feel confident to use it. However, if it remains necessary to have a level of technical expertise to ensure success, it is unlikely that teachers will stampede to use video communication in their classrooms.

This analysis contradicts the recognition by teachers of the possibilities of this powerful technology and their enthusiasm to use it to enhance and support the curriculum. Schools are very excited about the possibility of linking and developing video conferencing as an integral part of their curriculum development. It is important that teachers in the UK recognise that connectivity issues experienced in different regions of the world might not exactly match their expectations (e.g. it is often thought about Finland that 'Everyone has video communications' or about Africa 'remote locations have no connectivity,' but you cannot generalise about connectivity issues).

Around the world teachers are excited by the possibility of bringing the world into their classroom. The concerns of teachers are adding value to the curriculum and embedding ICT and video communications into their lessons. As we have discovered here in the UK, the technology is nothing by itself without the teacher in the classroom having the vision to use ICT and, in particular, the video communication resource in their classroom effectively. It is also important to recognise that video communication is just one resource in a wide range of communication facilities available in the classroom.

School managers must also understand that connectivity issues will extend or restrict the number and range of potential partners their teachers can work with. An 'either/or, ISDN/broadband connectivity' scenario will inevitably result in frustration, time wasting and failed links. Retaining the option of an ISDN link is advisable, and will remain essential for reliable 'classroom quality' links to many partners at the present time. Anything less than 'classroom quality' will be restricting and frustrating for teachers who are desperate to develop creative links and content, and develop their confidence and expertise in this exciting area.

Most new video conferencing equipment can use BOTH connectivity options, so retaining an ability within the school to use BOTH options is most cost effective in terms of teachers' time and energy and also the most practical in the long run. Teachers are severely restricted in the amount of time they have available to them, so a reliable, easy-to-use solution is much more important than other considerations. Gateway solutions need to be reliable and easily accessible to the busy classroom user, otherwise it becomes another layer of technology to contend with.

Mike Griffith September 2003

## SECTION E:

# Preparation for the Conference and the Conference itself

### IN THIS SECTION:

**Making arrangements with your partner**

**Preparing pupils/students**

**Preparing the room**

**How to proceed during the conference**

**Good practice tips**



**Having familiarised yourself with the equipment (see Section A and B), done some test links (see Section B), decided how you are going to use video conferencing to support your teaching (Section C) and who you are going to link with (Section D), you'll now be ready to conference in earnest!**

**Here are some guidelines for successful video conferencing.**

## **MAKING ARRANGEMENTS WITH YOUR PARTNER**

- Decide on a date and time for the video conference. It may be difficult to find a mutually convenient time for the link. School timetables will be different, rooms and equipment may not be available when you want them. Engage support from your head teacher, senior management team, technician and other staff. Supportive and enthusiastic colleagues who value video conferencing in the classroom can help overcome some of these problems.
- Ensure all dates, times, mobile phone numbers, contact names and ISDN numbers are exchanged in good time and checked. Use e-mail to confirm arrangements in writing to avoid any errors.
- Check school holiday dates in other regions and countries. Across the UK holidays vary from region to region. Remember, in the southern hemisphere summer is between December and January. In France and Germany school exams begin in May, with the effect that lessons for some pupils do not resume until September.
- If you are working with a partner in a different time zone outside the UK:  
Check time differences - Across the USA there are three time zones (New York is EST, Houston is CDT, California is PST). Australian States also operate different time zones. Remember, planning a conference for 2.00 pm in the UK will mean a presenter in California will have to conference at 6.00 am.  
Some schools in Europe often begin earlier and finish at lunchtime. Be prepared to hold lunchtime and twilight sessions or to change your timetable.  
Be flexible - meet at a convenient time for you on one occasion and an inconvenient time on another. You will find people can be exceptionally accommodating. At the Barrier Reef in Queensland, Australia, a colleague even arranged a sleepover event to enable them to take part in a video conference link to the UK.
- Check the age of the pupils and the size of the group you are linking with. Don't be put off if your partner class isn't a perfect match. In practice, perfect matches are rare and sometimes different age groups and abilities can work well together.
- If possible, meet your link teacher/colleague informally, over a video conference, before conferencing with the children/students.
- If you are working with an 'expert' from a museum or education centre, discuss in advance the age and level of the group you are going to work with, the format you wish

the lesson to take and the preparation you need to do. Exchange any relevant materials and information in advance to facilitate the smooth running of the session. If your presenter has a list of questions in advance, the artefacts s/he shows are more likely to match the interests of the pupils.

## PREPARING THE PUPILS/STUDENTS

- A group of pupils will naturally be excited and curious about their first video conference. They will want to talk about how it works, experiment and ask questions. It is worth providing an opportunity for them to try out the technology informally prior to the event so they will be ready to concentrate on the lesson content.  
If your video conference is to include a presentation by the pupils, practise the presentation and use of different camera shots beforehand. You can look at the presentation on an additional monitor or record it on a VCR to check that it can be seen and heard and to help work on stylistic improvements.
- It is also useful to practise your presentation with a 'sympathetic' far-end. Pupils soon become aware of the importance of how they look and sound and will swiftly develop the skills required for successful video conferencing.

There are suggestions about how you might do this in Section B.

## PREPARING THE ROOM AND EQUIPMENT

- Video conferencing is about seeing and hearing. A poor picture can make communication difficult; without sound, your video conference cannot take place at all. It is therefore essential to test your connection before your conference begins. Check the type of system being used at the far-end and arrange an informal test. Technical difficulties can usually be sorted out and adjustments to the physical environment can also be addressed.
- If you are planning to use additional technology such as a camcorder, document camera or laptop as part of the conference, practise using it beforehand.
- Give some thought to arrangements in the room. Plan where your contributors will sit so that movement does not disrupt the flow of the event. Your video conference partners will be more interested in seeing you than your furniture.
- Give some thought to camera shots that you will use during the conference. If you will not be controlling the camera yourself, brief the person who will be.

## INTERACTION IS THE NAME OF THE GAME!

The beauty of video conferencing is that it is interactive. If your educational goals are only 'content', you might decide to use a video recording. Thousands of dollars have been spent producing video recordings on any subject you can imagine. Video conference providers cannot compete with this for sheer content and graphic interest. However, if you want your students to be actively engaged, asking questions and participating in the content, then video conferencing is the next best thing to being there!

In order to maximise this interaction the teacher and provider really have to be a team and the student to teacher ratio has to be small. The more information I have from a teacher about the students' knowledge and interests the better! The best programmes have resulted from small classes where the teacher has sent me a seating chart, a description of the work the students have been doing and some questions the students have on the topic being covered.

Kelli Lewis - Ocean Institute, Dana Point, California, USA

## DURING A CONFERENCE

- Take the time to introduce yourselves to the far-end. Spend a little time on informal conversation to help put the participants at ease before starting the conference 'proper'.
- If the video or audio connection is poor at the start of your conference, it is better to say so early on in the event rather than politely struggle along getting increasingly frustrated. It may be that simple adjustments to lighting and microphone positions are the solution. This is why testing in the early stages is so important and worthwhile. Sometimes hanging up and reconnecting or rebooting the system will solve a poor connection.

During a recent link to NASA and a presentation about globes, maps and the International Space Station, all the pupils really wanted to know was "How does the link work?" "Where is NASA?" "What's the time difference?" and various questions about cultural issues. The presenter answered all the questions in an informal and entertaining way; the children were happy and settled down to the more serious business of the conference.

- \* **WHAT ARE THEY HEARING AT THE OTHER END?**  
It is important to speak slowly, deliberately and clearly. Remember that strong regional accents may cause problems for far-end participants, so 'slow down'.

- \* **WHAT ARE THEY SEEING AT THE OTHER END?**

Use your camera controls to adjust the image you transmit during the video conference. Sitting at a table is often a conference choice, but don't sit too far from the camera. The people at the other end of the conference want to see who they're talking to, not a silhouetted solitary figure at the farthest end of a very long table. When in close up, ensure you are presenting head and shoulder shots - not the top of the head, chin, chest or the back of the head!

When a discussion is taking place with a number of speakers, there is a number of facilities which can enhance your conference. If your system has pre-sets, take the time to set the camera position to selected positions beforehand

Alternatively, it might be helpful to have a camcorder attached to the video conference system. The camera operator can use the camcorder for the close up shots of speakers and the fixed camera for the group shots, cutting between the two as necessary using the remote control. This cuts out the camera movement there would have to be if only the fixed camera was being used, and the consequent 'break-up' of sound this sometimes causes. But it does require someone who can operate a camera and knows how and when to switch between cameras.

- The whole purpose of video conferencing is to interact. If you want to interrupt or pose an additional question, take the opportunity to do so.
- Remember, when you are video conferencing, even when there are a number of other participants, you can be seen at any time!
- If possible, consider having a second monitor in the room beside the video conference monitor. The pupils can see themselves on the second monitor and be aware how they are presenting themselves.

In one conference, a school forgot that they could be seen and, after their contribution, they took the time to break for lunch while another school was giving their presentation. This particular piece of bad manners reflected badly on the students taking part. While you are connected to the conference you should behave as if you are in the same room as your colleagues, even though you might be miles apart.

- Pupils need to listen to any questions they might be asked. On one occasion, the question asked by the presenter was repeated by the teacher in the class, answered by a pupil and relayed by the teacher back to the presenter. This seemed a complete waste of valuable time. If the pupils had been trained to listen and respond directly to the far-end this could have been avoided. Remember this is interactive video conferencing.
- To help remote learners participate and feel included, relate directly to them by looking directly into the video camera. This will help all users feel included and not just passive viewers.
- Too much background movement, hand waving and fidgeting will only distract and might cause the picture to blur. A quick demonstration or practice during an informal session can help keep movement to a minimum.
- Avoid talking over each other. Wait for a moment before responding.
- It is often good practice to mute the microphone when you are not talking.

- Passing the remote control round the group can encourage concentration. The individual taking control of the system can move the camera to find themselves, or use the relevant preset camera position before contributing to the conversation.

On one occasion involving four schools in a multipoint link, an 'open' mike ruined the conference as the camera repeatedly jumped to a noisy site. This situation was compounded by the constant feedback, which drowned out the sound of the presenter. Remember to make appropriate use of your mute button to avoid these problems and test your audio beforehand.

- Maintain enthusiasm. It is important when video conferencing to ensure that all participants are engaged. Make regular use of interaction and perhaps break down a long conference into a number of short conferences with breaks.
- When you become fully involved in a discussion or presentation, you begin to feel the people you are talking to are with you in your classroom. If you subsequently meet them face to face, you will find you are quite comfortable and at ease because you have in fact already 'met' each other!

A lot of this may seem obvious, but most people involved in video conferencing will have a story about arriving for a conference unprepared, with the equipment still in the box, remote controls without batteries, pupils arriving late, wrong phone numbers and so on.

With preparation and practice, video conferencing becomes a very exciting classroom resource. Without them, teachers can become frustrated and critical of yet another piece of technology

## GOOD PRACTICE TIPS

Enthusiastic and motivated teachers and their school partners can develop all kinds of exciting projects using video conferencing as a communications resource in the classroom.

However, there are a few basic and fairly obvious good practice tips which will enable your school to enjoy successful video conferencing links. Many a video conference has faltered because of personal communication errors, or because someone didn't include something as basic as writing down the international dialling code in the planning process.

Today's video conferencing equipment is very reliable. Surprisingly, most video conferencing failures are attributable to **human error** rather than technical failure.

For success, you must ensure that your personal communication skills are thoroughly and securely in place.

- Make sure your details are on the Global Leap directory, <http://www.global-leap.com> and are up to date and accurate. No one will be able to contact you or work with you if your details are incorrect!

- Make sure your partner school has your correct email address. **Write it down** accurately and send it to them. Don't rely on telephone messages alone.
- Please regularly check and read the emails sent to the address you have given to your partner. **Always** include your telephone number and identify who you are and where your school is located when emailing your colleagues. You can't expect anyone to bother replying to a vague email from an unidentified source!
- Confirm times, dates, and telephone numbers in writing (and check!)  
A missing or incorrect digit will mean failure - you would be amazed how often this simple error occurs! Include international dialling codes.
- Have you checked if there is a bar on international calls from your school. Don't rely on what someone else "thinks". Check it yourself.
- Can you make **and** receive calls from your school?
- Quote all times clearly in GMT. Calculate and allow for international time differences. Use the facility on [www.global-leap.com](http://www.global-leap.com) (Click On - Meeting Planner/ Time Zones, look for the icon of the alarm clock). Remember **British Summer Time** is GMT +1. Always quote times and identify them in both UK times, and whatever the other zone time is. (By writing, "We will test at 12:00 GMT, which is 07:00 EST" you will avoid any confusion on the part of the recipient of your message.)
- Write down the day and date in full, e.g. Monday April 3rd 2003 (in the USA this would be written 4/3/03 which can potentially lead to huge confusion and missed opportunities).
- Make a quick test call to [www.global-leap.com](http://www.global-leap.com) ISDN Automated Test Facility 020 8868 8963 or IP 80.68.35.5 to check **your** outgoing connectivity is working. (Your partner can do this too.) Note this will only confirm that YOU are receiving audio and video. A direct live test with your partner is also advisable. Don't assume people have their systems switched on all day just for your convenience. Make clear prior arrangements with your partner about a mutually convenient time to test.
- Make a brief telephone call 5 minutes before the video conference link to check systems are switched on and that everything is ready.
- One designated person must have their mobile phone **switched on** in the video conferencing location in case of technical difficulties. This will avoid having to resort to frantic hand signals, felt tip pens and bits of paper if the audio is not working. (A fixed telephone at the other end of the building is of no use on these occasions unless you are really fast on your feet!) It is frustrating for all concerned to watch your far-end sitting waiting for something to happen, with their mobile phone on the desk in front of them but switched off!
- Do the batteries in your handset work! Have you got spare ones?
- Has someone wandered off with your remote control?
- Don't sit the group in front of a bright light source or large window with no curtains or blinds. If you do, all your partner will see is dark silhouettes and no faces. Check that the image you are sending to your partner doesn't include your ceiling tiles, light fittings and furniture, but unfortunately misses out the heads and shoulders of the participants. Use your picture in picture facility and adjust the camera angle slightly.
- Have you sent your partner a seating plan and the names of the pupils taking part in the conference? This is especially important if your pupils have unusual or similar sounding names. You can spend embarrassing minutes asking people to repeat their names - and still get them wrong!

- Is the air-conditioning or heating system so loud that no one can hear what you're saying? Test the microphone from where the pupils are sitting, not from where the teacher is standing. This is particularly important when setting up a room where a class of younger children may be sitting on the floor but the microphone has been positioned somewhere high up, or even on the ceiling.
- Do you always receive telephone messages left at your school office? Is the office closed or the switchboard unmanned at certain times of the day?
- Always follow up and confirm important information left by telephone messages with a written email or snail mail. Copy **all** the people involved in the planning process for your VC event into your email communication.
- Can someone cover for you in an emergency? It is a shame to have to cancel on the day because one person is delayed or sick.
- Remember, too many failed video conferences and your partner may give up and look for a more reliable school to work with. Try not to waste each others time. Try to be flexible and accommodate each other's timetable needs.
- Remember to say **thank you** and give constructive feed-back and follow-up after your conference.
- And FINALLY if the very worst happens and the event is unavoidably cancelled, do have the courtesy to contact your partner with an apology and explanation. If you don't, you really can't expect them to want to work with you again. They will find another more reliable school.

Remember good manners apply to video conference meetings just as they do in other types of meetings or partnerships.

Please don't let this list put you off. Although it has been compiled from **real experiences**, now that you know what **can** go wrong, you won't make the same mistakes yourself!

Most video conferences go really well and everyone involved finds their partnership rewarding, exciting and motivating.

If you do need a little help and advice we can try and help.

[www.global-leap.com](http://www.global-leap.com)

## SECTION F:

# Video Conferencing Technology in More Detail

This section develops the issues discussed in *Section A*. It gives more detailed information for the following areas:

**Video Conferencing Systems**

**Software**

**Optional Equipment**

**Standards**

**Bandwidth**

**ISDN Conferencing**

**IP Conferencing**



# Video Conferencing Systems

## HARDWARE

The following section includes additional notes relating to the main types of video conferencing system.

### LOW-COST, COMPUTER-BASED SYSTEMS

Low-cost systems are based on standard computer hardware. This type of system needs a full-duplex sound card, a headset, a web-cam (usually connected via a USB port) and suitable software.

#### Uses

- Suitable only for personal one-to-one conferences where the quality of sound and picture is not critical.
- The quality of sound and picture will partly depend upon the power of the computer and the network being used for the link. Can be used across the Internet and broadband networks (See 'Communications Links' below).
- Not suitable for use with groups or classes.

#### Pros

- Low cost

#### Cons

- Low-cost camera may reduce the quality of picture
- Use across the Internet can be problematic and unreliable
- The lack of echo cancellation means that the use of a headset is essential
- The PC has to cope with the processing of audio and video

#### Cost Range

In the region of £50 for a camera to add to an existing computer

#### Notes

If used with a group, multiple headsets can be used via a splitter unit, enabling more than one user to conference.

PCs have had NetMeeting included with MS Windows for some years. The recently launched XP version of Windows is supplied with Windows Messenger as well as NetMeeting. Apple Mac computers can run a range of software. Some Mac packages, such as VideoLink Pro, are compliant with video conferencing standards, while others require the same software running on near and far-end systems. (See Software section for more details.)

These systems are suitable for IP-based video conferencing across local and wide area networks or via a dialup connection. It is not possible for such a system to call an ISDN-based video conferencing system.

*(Note: there is a distinction to be drawn between a dedicated or group-based video conferencing system which is connected to the ISDN network, communicating using H.320 conferencing protocols, and an IP-based H.323 system which uses ISDN to dial into a network.)*

Applications and whiteboards can be shared whilst in a conference according to the facilities available within the software. The bandwidth available for the link may restrict or slow down application sharing. See Application and File Sharing for more details.

## DESKTOP SYSTEMS

A number of manufacturers market units that can provide a better conferencing experience due to the use of better quality cameras and, in particular, better control over the audio.

Many units plug into the computer via a USB interface; others have to be installed into the computer. The majority of systems support IP conferencing; a smaller number support ISDN-based conferencing.

These systems will use either Microsoft NetMeeting or proprietary software. Most systems of this type are standards compliant.

### Uses

- Suitable for personal one-to-one conferences or small group use.
- The quality of sound and picture will partly depend upon the network being used for the link. Can be used across the Internet and broadband networks (See 'Communications Links' below.)

### Pros

- Better quality sound and picture
- Does not require a headset
- The unit processes the audio and video
- Not suitable for whole class/large group use

### Cost Range

In the region of £400 - £900 to add to an existing computer

## VIDEOPHONES

Videophones also fall into the category of desktop systems. As the name implies it is a telephone unit with a small built-in screen and camera. They can connect with other videophones or the more expensive dedicated units. Videophones can be used hands-free with small groups, although it is better if the person speaking uses the handset or attached microphone. Additional cameras and monitors can also be attached.

### Uses

Suitable mainly for individual use or groups of two or three. Works well for providing support and advice to video conference users. Good for one-to-one meetings. Can be used in multipoint conferences.

### Pros

- Small, compact, self-contained unit

- Easy to use
- Compatible with more expensive units
- Good sound control

#### **Cons**

- Control over camera limited
- Only suitable for use with small groups

#### **Cost Range**

£800 - £1200

## **GROUP SYSTEMS**

There is a wide range of self-contained units available in this category. Most sit on the top of a normal television and use the television for picture and sound. The unit may contain the microphone or have a table microphone attached. The camera is usually built in as part of the main unit. All functions, including camera movement, are usually controlled by a remote control or remote keyboard.

Some units support the use of dual screens (one to show the near-end, a video being played or an image from a document camera and the other to show the far-end).

Group systems, including the monitors, can be built into roll-about cabinets, or may simply be small set-top units that can be used in a number of locations. However, so-called roll-about systems are often only used in a dedicated video conferencing room or studio and would not survive being rolled around a school.

#### **Uses**

- Suitable for all uses from one-to-one up to whole class use.

#### **Pros**

- Very good sound and picture quality (depending upon type of link used)
  - Many peripherals, e.g. video players, document cameras, PCs can be plugged in
  - Straightforward to use
  - Can be used for both ISDN and network (IP) based links
  - Can support multiple ISDN lines for better quality sound and pictures
- (see 'Communications Links' below)

#### **Cons**

- Can be expensive

#### **Cost Range**

From £2500 - £15,000 plus

Units in this category are often sold with a number of options, e.g. support for ISDN, IP or both, choice of the number of ISDN lines supported or choice of microphones. These choices can result in a wide variation in cost. When choosing a system the following should be considered:

- Number of ISDN lines supported
- IP bandwidth supported. Schools should consider the purchase of systems that support both ISDN and IP even if both may not be used initially.
- Type of microphone supported. For example, some include microphones within the base unit; others use remote/table-top microphones
- Range of connections for connecting peripherals such as document cameras, VCRs or laptops. Note that some systems have connections for a VCR for playback only and not for recording.
- Ability of the audio system to discriminate between voices and background sounds.
- Ability of the audio system to detect the location of the person speaking and move the camera to that person.
- Ability to give the user easy control of sources, e.g. cameras, laptops, VCR inputs, etc.
- Ease of use
- Support for multiple monitors to show near-end, far-end or source such as a laptop

## VIDEO CONFERENCING RUNNING COSTS

There is a number of ongoing charges associated with video conferencing. These include support contracts for the video conferencing systems, ISDN connection and rental charges and multipoint access charges.

### SUPPORT CONTRACTS

Many companies offer support contracts on video conferencing systems. These contracts can give access to technical support and offer system replacement if a fault develops. Choice of contract will depend on how important it is to have your system replaced quickly if it fails. A support contract can typically cost about 10% of the initial purchase price per annum.

### ISDN Costs

ISDN costs include a rental charge and ongoing call charges. Rental charges for ISDN 2e range from £60 - £90 per quarter depending upon the supplier and payment plan. A number of payment plans charge a higher rental but include call allowances. Multiple ISDN lines will incur multiple rental charges. One ISDN line (2 x 64kbs channels giving 128kbs) is usually adequate.

Local or national video conference calls are charged at the standard telephone rate for each ISDN channel. A video conference using both channels of a standard ISDN 2e service will cost the equivalent of two standard calls. International video conference calls are sometimes charged on a different tariff to standard phone calls.

The number of lines your system uses multiplies this cost. A system that supports three ISDN 2e connections (six channels) will incur the equivalent of six calls if all the channels are used during a video conference. This would also incur three times the rental costs. The cost of regular use of a video conference system can be calculated and built into an annual budget. Budgets will be easier to set after monitoring use for a year. As an example, Global Leap uses video conferencing several times a day to make a mixture of local, national and international calls. The average costs of calls are £200 per month. There are companies that offer reduced call charges whilst making calls via standard BT lines, resulting in up to 30-40 per cent discount on the costs of calls.

Call costs vary from country to country and are not necessarily calculated according to distance. A call to Connecticut USA can be cheaper than a call to some European countries.

Most video conferencing activity will also involve receiving calls. Costs can be shared with some partners, particularly where regular calls take place. In some instances, calls from location A to location B may be cheaper than vice versa, if location A has a lower call charge tariff.

## IP Costs

Broadband connectivity is usually charged at an annual cost based on the capacity of the link. Initially this cost may be hidden by the various government initiatives that are currently putting broadband links to schools. Once the link is in place, there are usually no additional usage charges incurred for access to the network, including video conferencing. Schools should be aware that the use of video conferencing may put pressure on existing capacity, which could result in additional costs if the overall bandwidth into the school has to be increased.

## UPGRADING SYSTEMS

Some schools will already have video conferencing systems and some will be considering purchase. A key factor is the connectivity options available on a particular system. Some systems are designed for use solely on ISDN or IP. Others support both. Some ISDN systems support connection to just one ISDN line (two channels); others support multiple lines.

The choice of system will clearly have an impact on upgrade options. Some existing systems may be upgradeable; others may not, incurring replacement costs. Some companies have a 'trade-in' programme in place to assist in this process.

## AUDIO CONTROL ON DESKTOP AND GROUP SYSTEMS

Modern video conference systems use autogain control of the audio input in conjunction with the echo-cancelling electronics to minimise the effect of big variations in sound level. In an interactive session it is far better to have all the participants, if they are all contributing to the meeting, to be sited at an equal distance from the microphone. The audio input will 'hear' equal sound pressure levels and adjust the audio input level [and thus the audio the far-end hears] to a 'standard' level to maintain the echo cancellation performance. If a speaker gets close to the microphone it won't matter how loud he speaks, the autogain control system will actually reduce the input audio level to the 'standard' level. If another speaker, further away, now speaks, the system will not have time to adjust the input level for a short period and the second speaker appears to be very quiet. This is a very common problem for new users of video conferencing and is often characterised by the new user speaking 'at' the microphone in an attempt to ensure the far-end can hear correctly. It is also important to ensure there is reasonable distance between the microphone and the speakers. Usually this is three to five metres for group systems. This helps the echo canceller.

# SOFTWARE

Group systems will be controlled by software. This will have been designed for the unit and is specific to it. Updating of the software is often possible by downloaded from a central server.

Low-cost, computer-based systems will use conferencing and collaboration software available for the type of computer. A number of programs exist such as Microsoft NetMeeting, VideoLink Pro and Microsoft Messenger. All programs can manage directories of users, initiate conferences, control sound and video as well as provide collaborative tools and application and file sharing. The hardware specification must meet the requirements of the software.

Schools need to evaluate the suitability of any software they plan to use in the classroom.

Desktop systems will often be supplied with specific, proprietary software which matches the hardware.

Some software is standards compliant, enabling users to conference with other standards compliant systems, e.g. a PC running NetMeeting can conference with a group system or a desktop system running proprietary software. It may not be possible to use some features on the lower cost systems and the video quality may be poorer but basic conferencing will be possible.

Proprietary software will enable conferencing with other units as long as it is standards compliant.

Some software packages support the use of Directory Servers and connection via Gatekeepers. Depending on the network you use, this may be an important feature. NetMeeting and many proprietary software packages support these services.

*Windows Messenger*, commonly included with the Windows operating system, is part of a self-contained service that requires users at either end to have a version of Messenger installed. Messenger relies on a service which can identify those you wish to contact and inform you if they are currently logged on to the service. It is possible to video and audio conference with contacts as well as share applications, chat and files. It is not possible to conference from Messenger to users on other systems or using other software. Other video conferencing software packages similarly require both near and far-ends to be using the same software.

## APPLICATION AND FILE SHARING

Application sharing requires software that supports the T.120 protocol such as Microsoft NetMeeting. This will enable application sharing between different systems. If using a computer-based video conferencing system, application sharing can take place at the same time as the video conference, assuming there is enough bandwidth available.

It can be more difficult to share applications if using a dedicated group system, however there is an argument for using systems together and capitalising on their respective strengths. For example, the video conferencing may take place using a group system with the image

displayed through a TV whilst NetMeeting is run on a separate PC for the application sharing, with the image displayed on computer monitor or Interactive Whiteboard. The users at the other end would need a similar setup. This approach is particularly beneficial if using ISDN as application sharing will compete for bandwidth with the video/audio. The developing use of broadband will enable more "mixing and matching" of systems.

Some group systems can be connected to a PC via a network connection or directly so that images or PowerPoint slides can be sent to the far-end as a presentation.

Programs such as NetMeeting or Click to Meet include general applications such as Chat and shared whiteboard. Chat opens a window at each end; users can then type messages to each other. Whiteboard in this context is a program that looks like a painting or graphics program. When run it is visible at both ends of the link; users from either end can draw or write on it. This should not be confused with an interactive whiteboard mentioned elsewhere in this document. These general applications are designed to support collaborative working and can operate with or without an audio or video conference taking place at the same time.

The sharing of specific applications such as word-processing or spreadsheets is possible with some conferencing software. In practice, one user will open an application, e.g. a document in a word processor, and either user can take control and edit the document.

File sharing enables users to send files to each other across the conference link.

## OPTIONAL EQUIPMENT

### VIDEO CASSETTE RECORDERS (VCRS) AND CAMCORDERS

VCRs or camcorders can be connected to most group systems and some desktop systems. This gives the potential of showing video to the far-end, for example a video of work produced by pupils or video of the school environment. Camcorders can also be used as document cameras (see below) to show close-up views of objects or documents.

Some systems have video/audio out sockets that enable video conferences to be recorded. It should be noted, however, that the picture quality will be similar to the actual conference - this may have been acceptable in a live conference but it may not be good enough to use as a recorded archive.

### DOCUMENT CAMERAS

Document cameras can be used on systems with a video input. The document camera consists of a flat platform with a camera mounted above. Objects and documents can be placed on the platform and focused on by the camera. A document camera will usually have lights mounted above the platform to light the object.

### LINKING LAPTOP OR DESKTOP COMPUTERS

The connection of a laptop or desktop computer to a video conferencing system can enable presentations to be made to the far-end using presentation software. Files and applications can also be shared as described above. Group systems will often have a means of connecting a computer, either via a specific socket such as a 'monitor in' socket or via a network connection.

If the network connection is used, configuration may be necessary for the video conferencing unit to recognise the connected computer.

Some video conferencing systems can be managed from a computer attached via a network through a Browser interface. This is particularly useful if there is a number of systems across a site.

## USE WITH PROJECTORS

Most video conferencing systems can be connected to a data/video projector to give a large image. This can be useful when conferencing with large classes or groups. Enlarging the image with a projector can make it look poor, particularly if it is a low bandwidth video image. It may be better to reduce the size of the projected image or use a large TV/monitor.

The audio from the video conferencing unit can be put through the speaker in a projector but these are often very low-powered. It may be necessary to consider using another form of amplification.

A problem associated with projecting a large image is that it becomes difficult to place the near-end camera in a position close to the centre of the image. This is important because those watching the conference end up looking at the projected image and not the camera. This can be disconcerting for users at the far-end who may feel that those at the near-end are not giving the conference their full attention. This can also be a problem with users who are sitting close to large monitors.

## INTERACTIVE WHITEBOARDS

Using a video conferencing unit in conjunction with an interactive whiteboard can add a new dimension to conferences. Although it is possible to project the video image onto the whiteboard, the combination of a TV/monitor for the video image and the use of the whiteboard for data and application sharing can enhance the potential of presentations and collaborative work.

### For example:

- A teacher can be teaching a lesson where s/he appears on the TV/monitor whilst showing a PowerPoint presentation that appears on the whiteboard.
- Two groups can be conferencing and using the whiteboard as a shared space that each group can use for making notes and drawing diagrams whilst seeing each other on the TV/monitor.
- Two classes can be working on a mathematical problem on a shared spreadsheet displayed and controlled on the interactive whiteboard whilst seeing each other on the TV/monitor.

## STANDARDS

Video conferencing systems rely on standards to enable them to link to each other, particularly if the systems or software are from different manufacturers. A range of standards exists and advice should be sought when purchasing a system to ensure compatibility.

It may be useful to be able to recognise the main standards such as H.320 - ISDN-based conferencing and H.323 - IP-based conferencing. T.120 is the standard that enables application and data sharing. Others may be included such as H.281 - far-end camera control or H.243 - multipoint conferencing. Most systems will also adhere to a wide range of audio and video standards.

## BANDWIDTH

Video and audio streams are very demanding of the capacity of the communications link. To overcome the potential constraints imposed by the link, methods of compression have been developed and refined. Video conferencing systems are built around CODECs (COmpressor - DECompressor) that handle the compression. To enable different makes of video conferencing systems to communicate with each other, standards have been developed, including the compression standards.

Some manufacturers include features which will only work if communicating with systems of the same make, often resulting in better quality sound and vision.

The capacity of a link is referred to as the bandwidth. This is generally measured in kilobits per second (kbs) or megabits per second (Mbs). This is a measure of the theoretical maximum throughput.

A single ISDN 2e installation supplies 2 x 64kbs channels, enabling a video conference to utilise 128kbs of bandwidth. This is the minimum required for acceptable video conferencing. Even at 128kbs the pictures will take time to stabilise and fast movements will blur.

Some group systems have the capacity for more than a single ISDN 2e line, giving better quality audio and video. If two, three or four ISDN 2e lines are available the system can run at 256, 384 or 512kbs respectively. To use this feature the system at the far-end also needs to have the same number of lines. This can be expensive as each line will incur a rental cost and a single conference may cost the equivalent of up to eight calls.

IP-based video conferencing potentially increases the bandwidth available but this may be constrained by other users sending data across the network at the same time. A user may have to select a lower bandwidth setting so as not to conflict with other users. All video conferencing units will have a maximum data rate at which they can operate over IP. Protocols are being implemented to alleviate the problem of congestion on a network - see *Quality of Service*.

## ISDN (Integrated Services Digital Network)

ISDN is a dial-up service. Once the link is established it is dedicated to that call and is unaffected by other users. This means that the quality of a video conference over ISDN is generally predictable.

There are two main options for the supply of ISDN in the UK: BRI - Basic Rate Interface or PRI - Primary Rate Interface.

BRI is supplied as ISDN 2e, which is 2 x 64kbs channels with an additional signal or control channel. Many schools have or have had BRI ISDN for Internet access prior to the installation of broadband. Most video conferencing units expect BRI ISDN.

PRI is supplied with up to 30 x 64kbs channels in options starting with six channels. A number of schools and colleges use PRI ISDN for their phone system. Some of these phone installations can be configured to offer BRI ISDN by the addition of internal interface cards. This can be very expensive equipment and it is usually cheaper to get a PRI-based video conferencing system and a PRI line with only six channels activated. Contact your phone system installer for details.

## IP VIDEO CONFERENCING

IP-based video conferencing is theoretically possible across any IP enabled network, be it the Internet, a Local Area Network (LAN) or Wide Area Network (WAN). There are many reasons why, in practice, video conferencing may not work, including the active barring of video conferencing protocols, the other traffic on the network, or delays built up due to the signal having to pass through a large number of devices between users.

IP video conferencing is possible across the **Internet** but because there is no guarantee of capacity or bandwidth from one end of a link to the other, the results can be unpredictable. The problem is mostly the delay or 'latency' inherent in the way the Internet is structured. The Internet uses routing tables defined by the service providers that are optimised for data. Video and audio packets must arrive quickly and in sequence to deliver a video conference and the Internet has no way of doing this. This makes video conferencing across the Internet unsuitable for lessons where a teacher is working with a class and relying on the conference. Internet video conferencing may be suitable for one-to-one personal links.

The use of **broadband** networks between schools is beginning to make IP-based conferencing more of a possibility. The greater capacity of a broadband network and the fact that many networks are privately managed can result in more predictable performance, although other traffic may still be a problem. The network within a school could also be a bottleneck for video conferences. There will be no guarantee of performance for video conferencing until Quality of Service protocols are implemented on networks (see below). A managed broadband network is not the same as broadband Internet. The problem of 'latency' with the Internet will still be present with broadband Internet access.

The network **LAN** within a school can be used for conferencing just within the site.

## REGIONAL BROADBAND GRIDS

Many schools are now linked to regional networks such as the regional Grids for Learning run by Regional Broadband Consortia (RBC). This potentially enables conferencing between schools, LEAs and other connected institutions such as libraries or ICT centres without having to use the Internet. On a regional network where firewalls (security devices installed to protect a network) are used, video conferencing protocols have to be enabled to allow conferencing. The network managers may also have implemented a directory service to enable conferences to be established within and outside the grids (see below).

Calling between networks, e.g. from one regional network to another has to be enabled and supported by both networks. Some RBCs have established gatekeepers to control access; these enable users internal to a grid or network to conference with external users without compromising the security of the network.

In England the RBC Interconnect project has linked regional grids and LEAs which are not part of a regional grid to each other. The project has also agreed a common numbering scheme for the identification of individual video conferencing systems using E164 numbering. This will identify which grid, LEA and school a system is in and which particular system it is within the school. This information can be used by directory and scheduling systems to establish and manage calls.

## ESTABLISHING IP-BASED VIDEO CONFERENCES

Each device on a network has an address called an IP address (for example 211.104.141.10). At its simplest, a conference call may be established by calling the remote user's IP address. Many computer-based systems will use software, such as Microsoft NetMeeting, to establish the call. Other computer-based systems use proprietary software.

Using the IP address works as long as you can find the address of the remote user; however, these addresses are often allocated to a system when it is switched on or connected. This means that a particular system may pick up a different address each time it is used. This is often the case with systems connected to the Internet. Addresses may also be hidden by the use of Network Address Translation (see Glossary) at the site. This can cause connectivity problems for video conferencing.

The solution is to use some form of directory. Many networks have directory servers for conferencing; there are also some global directories. Each system logs onto the directory server when it is started up. A list of those logged on can then be seen as a list of names. A conference is established by clicking on the name of the remote user; the system then takes care of addressing issues. Software such as Microsoft NetMeeting has an option to add directory server details. Access to an ILS or Internet Locator Service is required to use this facility.

Some networks have set up a gatekeeper. Gatekeepers operate in a similar way to directory servers but can also allow conferences with external users without compromising the security of the network. The details for a particular network should be obtained from the network administrator. Services are available that handle directory functions and enable advanced scheduling of conferences, multipoint conferences and bridging between different systems such as IP and ISDN.

## ISDN TO IP 'BRIDGING'

Because the two systems use different protocols a 'bridge' between the two is required to conference between ISDN and IP. This equipment would normally be part of a regional or national network. Some companies provide bridging as a chargeable service. A limited number of video conferencing units can bridge within the unit.

## QUALITY OF SERVICE (QoS)

A series of Quality of Service protocols has been established which can be implemented on a network so that certain applications such as video conferencing that require dedicated and predictable bandwidth can ensure the bandwidth is available for the duration of the conference. The bandwidth will not be affected by the activities of other users. Quality of Service may be implemented on a LAN or a regional network.

## SECURITY AND CHILD PROTECTION ISSUES

As with the use of the Internet or email there is a number of technical and child protection issues that need to be considered. Whilst technically schools will want to protect their systems from hackers and viruses it is the need to protect children from unauthorised communication that is of paramount importance. This sort of communication could equally be initiated from within school as much as from outside.

### Physical Security of the Video Conferencing System

Consideration must be given to the location AND setup of the video conferencing unit:

- Can it be locked away when not in use?
- Can it be password protected to prevent unauthorised use?
- Have the administration utilities been password protected?
- Is the system set to auto-answer? This can be a problem if the system is left on but with the TV/Monitor switched off so that someone could dial in and eavesdrop unnoticed.
- Are unauthorised users prevented from making ISDN calls and running up large bills?

### Network Security (IP video conferencing)

It is beyond the scope of this book to discuss all the potential network security issues. Many schools using IP-based conferencing will be connected to an LEA or RBC network. The LEA or RBC will have put in place Firewall and possibly Gatekeeper systems to protect the network and prevent unauthorised establishment of conferences by users outside the school, LEA or RBC.

It should be noted that many setups will register an end-point as soon as it is switched on; this could allow another school or user to connect straight in without pre-arrangement. Whilst this may be acceptable in some circumstances it does open up the possibility of eavesdropping as discussed above. All users must be made aware of the potential risks involved.

Schools should be aware that systems connected directly to the public Internet are particularly vulnerable because of the lack of external security systems. The use of public ILS servers to establish calls is also a potential hazard because the school system is registered and available publicly for connection by any Internet user.

# SECTION G: Glossary

All the definitions in this Glossary relate to the video conferencing context



# A

## **Analogue**

Analogue audio or video signals from microphones or cameras are represented by continuously changing values which represent the change in volume or frequency of sound or the changing scenes in a captured video. In contrast digital audio or video is represented by discrete values, measured at set intervals, which represent the audio or video being captured.

# B

## **Bandwidth**

In general use - the data capacity of a link or service, measured in bits per second (bps), thousands of bits per second (kbps) or millions of bits per second (Mbps).

## **BRI ISDN**

Basic Rate Interface ISDN - One of the options when renting an ISDN service. 3 digital signals over a single pair of copper wires: 2 (B) channels (64kbs each) for video and data and 1 signal (D) channel. See also PRI ISDN

## **Bridge**

A bridge connects three or more conference sites so they can simultaneously communicate with each other. Audio and video bridges are available. Bridges are also called Multipoint Conferencing Units (MCU).

## **Broadband**

Refers to the capacity of a communications circuit or link. DfES have defined broadband as a speed greater than 2 Mbps for connections to schools.

# C

## **Camera presets**

Pre-defined camera angles that can be programmed into a video conferencing system and selected using a single button press. This enables those contributing to a discussion to be quickly focused on.

## **Codec**

Compressor/Decompressor - a system of converting video and audio to digital format and compressing the signal prior to transmission and decompressing to the far-end. The information in a video transmission is squeezed into a fraction of its former bandwidth by a codec; the resulting compressed video can be transmitted more economically over a lower capacity link. Some information is sacrificed in the process, which may result in lower quality picture and sound. Normal PAL TV signals require around 270Mbps of digital bandwidth for absolute picture transmission. The coding process of any video conferencing system has to minimise this

using very high compression ratios to achieve any performance whatsoever. Compression ratios and predictive coding techniques used are delivering in excess of 1000:1 compression ratios so a lot of information is lost with video conferencing codecs.

## **Continuous Presence**

A method of displaying far-end sites during a multipoint conference. Each system connected is displayed in a section of the screen so that all sites can be seen at the same time.

# D

## **Desktop video conferencing**

Video conferencing using a computer or videophone. Typically for one-to-one calls.

## **Document Camera**

A camera used to show documents, pictures or 3D objects. It consists of a flat platform with a camera mounted above. Objects and documents can be placed on the platform and focused on by the camera. A document camera will usually have lights mounted above the platform to light the object.

## **Document Sharing**

A feature supported by many desktop video conferencing systems that enables participants at both ends of a video conference to view and edit the same document.

# E

## **Echo Cancellation/Suppression**

In any situation where microphones and speakers are used for two-way communication there is the potential echo - e.g. hearing your own voice a short time after you have spoken (this is due to the microphone at the far-end picking up your voice and relaying it back to you). Echo cancellation eliminates the possibility of this happening and is important for easy communication.

# F

## **Far-end**

The distant video conferencing system to which you are linked.

## **Firewall**

A means of analysing and controlling data passing between computer networks. Often used as a security device to prevent unauthorised access to a network, it can also control the type of traffic being transmitted and received. A firewall will have to be configured to enable video conferencing protocols to pass through.

## FPS

Frames per second - TV in the UK [PAL] is displayed at 25 frames, or individual pictures, per second. Video conference systems can deliver up to 30fps and this is referred to as 'Full Motion Video'. Speeds of less than 25 fps can result in jerky video motion. It is accepted that the eye generally considers 15 fps as full motion video. It should be noted that 'quality' of video conference systems is often confused with frame rates. If the image is still, a video conference system will achieve the maximum frame rate of 30fps. However full motion may well reduce this on a cheap system to 2-5 fps. Quality should be measured as the ability to sustain at least 15fps under heavy motion. Some systems will reduce the resolution [QCIF] to maintain high frame rates, giving the impression of good motion handling but at the expense of poor perceived images.

## G

### Gatekeeper

A security device that controls audio and video conferences into and out of a network. It can restrict or allow users external to the network to conference with internal users.

### Group Systems

Dedicated video conferencing units suitable for use with small or large groups of users.

## H

### H.221

The ITU-T standard relating to the communications protocol for video conferencing.

### H.242

Part of the ITU-T's H.320 family of video interoperability recommendations. This recommendation specifies the protocol for establishing an audio session and taking it down after the communication has terminated.

### H.243

ITU-T recommendation setting the procedures for establishing communication between three or more video conferencing sites - multipoint conferencing.

### H.261

The ITU-T's recommendation that allows dissimilar video codes to interpret how a signal has been encoded and compressed and to decode and decompress that signal. The standard also identifies two picture formats: the Common Intermediate Format (CIF) and the Quarter Common Intermediate Format (QCIF). These two formats are compatible with all three television standards: NTSC, PAL, and SECAM. This is the video compression standard.

## H.320

This is the umbrella communication standard and defines what basic video, audio and data standards are mandatory and optional.

## H.323

An ITU-T standard developed to promote compatibility in video conference transmissions over IP networks. H.323 was originally promoted as a way to provide consistency in audio, video and data packet transmissions in the event that a local area network did not provide guaranteed service quality. This has a number of variations. Most manufacturers are operating to v3 standards but they have yet to be applied across the industry. See *Quality of Service (QoS)*.



## Interactive Whiteboard

Similar to a normal, wall-mounted whiteboard but with a surface material that contains electronic sensors. A computer image is projected onto the board and the computer is then controlled from the board using either the finger or a special pen.

## Internet

When spelt with a lower case "i", it is a group of two or more networks connected together. Internet spelt with a capital "I" is the collection of all the interconnected networks in the world, and is often simply referred to as the 'net'.

## IP

Internet Protocol - standard for addressing devices and transmitting data between devices on a network.

## IP Video Conferencing

Conferencing across local or wide area networks and between networks.

## ISDN

Integrated Services Digital Network - digital dial-up "telephone line" allowing faster data transfer rates than existing analogue lines. Allows simultaneous transfer of voice, data and video information.

## ITU-T

The International Telecommunications Union-Telecommunication Standardization Sector, which establishes "recommendations" for standard protocols.



## kbs

Kilobits per second - the transmission of digitised information over a network at a rate of 1,000 bits per second.

# L

## **LAN**

Local Area Network - a computer network linking workstations, file servers, printers, and other devices within a local area, such as an office or school site.

# M

## **Mbps**

Megabits per second - the transporting of digitised information over a network at a rate of one million bits in any given second.

## **MCU**

Multipoint Control Unit - a bridging device that connects three or more conference sites so they can simultaneously communicate with each other. The MCU uses fast switching techniques to switch between the connected systems and mixes the audio (and sometimes the video in continuous presence mode) from all locations.

## **Mute**

The ability to switch off the microphone on the video conferencing system so that those speaking at the far-end are not interrupted. It can also be used for privacy.

# N

## **NAT (Network Address Translation)**

NAT reduces the number of public Internet addresses required by an institution and has the additional advantage of “hiding” the private IP address of a particular system from the outside world. There are a number of ways in which NAT can be set up. Some configurations can restrict the number of concurrent video conferencing sessions from a site.

## **Near-end**

The video conferencing system at your own site (see far-end).

## **NetMeeting**

A software tool from Microsoft which manages audio and video conferencing on a PC. It supports the use of microphones and cameras and can access central directory servers and gatekeepers.

## **Network**

Two or more computers linked together and able to share resources constitutes a network.

# P

## Peripherals

Devices such as document cameras, camcorders or VCRs that work with a system but are not integral to it.

## PRI ISDN

Primary Rate Interface ISDN - provides up to 30 x 64kbs ISDN channels. These can be used as individual circuits, for applications such as phone lines, or used together to provide greater bandwidth for data communication. PRI ISDN can be rented in different quantities from 6 - 30 channels.

## Protocol

Standards which enable devices such as computers or video conferencing units to communicate with each other.

# Q

## QoS

Quality of Service - a range of protocols which enable an audio or video stream to claim and protect required bandwidth for the duration of a conference.

# R

## Roll-about

A totally self-contained video conferencing system consisting of codec, monitor(s), audio system, network interfaces, etc. These systems can, in theory, be moved from room to room. In fact, they are not really portable because they include electronic equipment that does not benefit from a great deal of manhandling and are quite heavy.

## Router

A device (or software package) that handles the connection between two or more networks. Routers concentrate on looking at the destination addresses of the data passing through them and deciding the onward route.

# S

## Streaming

The delivery of audio and video live across the Internet. The audio and video streams are listened to or watched via a computer attached to the Internet. Video conferences can be streamed live, opening up the conference to many more participants who can view it, but would need to use e-mail or a different communications method to feed back responses.

# T

## **T.120**

A standard for sharing graphical information such as applications. Users can share and manipulate information, much as they would if they were in the same room, though they are working over distance and using a computer platform.

## **TCP/IP**

Transmission Control Protocol / Internet Protocol - the two fundamental protocols which form the basis of the Internet and inter-network communication.

# U

## **USB**

Universal Serial Bus - a method of connecting peripherals such as cameras, printers, scanners and disk drives to computers. Faster than standard serial connections, USB connectors are now common on new computers.

# V

## **Voice Activation**

1) During a conference a camera may be voice activated. The camera automatically moves to focus on the person speaking. 2) During a multipoint conference, where just one site is displayed on the screen at any one time, the site where someone is speaking is the site which is on screen for all the other sites.

## **VPN**

Virtual Private Network - A network across a region that runs on facilities provided by a service provider. The network is secure from access by unauthorised users.

# W

## **WAN**

Wide Area Network - a communications network that services a geographic area larger than that served by a local area network or metropolitan area network.

## **Web-cam**

A small, low-cost camera that can be connected directly to a computer, usually via the USB port.

## **Whiteboarding**

A term used to describe the placement of shared documents on an on-screen 'shared notebook' or 'whiteboard'. A whiteboard will include tools for 'writing' and drawing, enabling collaborative work to take place.

## SECTION H:

# The Future

## SECTION H



## Videoconferencing and e-Learning

***'E-Learning is improving the quality of learning through using interactive computers, online communications, and information systems in ways that other teaching methods cannot match.'*** (Towards a unified e-Learning strategy DfES July 2003)

It is clear that video conferencing sits firmly within the field of e-Learning. It is one of a range of ICT tools and as such it will increasingly benefit from being used along with other collaborative tools such as forums, application and file sharing and email. But these tools have to meet the needs of the teacher in the classroom by being easy to use, reliable and flexible.

At a practical level teachers and students will need tools that enable them to better manage use of video conferencing systems. This will increase their potential use in a number of ways:

- Teachers and students will be able to video conference when and where they need to. Older students, for example, already manage their own use of video conferencing for distance learning.
- Security and protection for the individual are vital. Increasingly the integration of video conferencing into authentication systems such as portals will provide protection whilst giving freedom of use within necessary boundaries.
- The ability to schedule calls and book resources, particularly for multipoint calls, will also be important if the teacher is going to be able to better plan for using video conferencing during a lesson.
- With the increase in access to broadband in the home it will be possible to provide a managed video conferencing service to students, providing greater flexibility for them to choose when and where they access support for learning.
- With the greater flexibility that is already developing around the school day it may be more convenient for students and teachers to communicate at times using video conferencing.
- Video conferencing can be used to support students who are not in school, for example students in hospital schools could participate in a lesson at their school from the hospital.
- New mobile technologies, including mobile phones, make it possible to conference from a wide range of locations, opening up the possibility of conferencing with teachers, experts or students 'in the field'.
- The integration of video conferencing with other technologies such as video streaming and chat has already widened the reach of some conferences whilst still providing an element of interaction. As schools move to the IP environment for video conferencing the potential for combining the use of different technologies will increase.

## So what about the impact on teaching and learning?

'After years of disembodied voices emerging from cassette recorders, devoid of interest, context, and any para-linguistic clues which aid understanding, now they have 'real' children who laugh and wave, look nervous and stumble the same as themselves. Suddenly there is a reason to communicate.'

*MFL Teacher - Middle School*

'Put simply, when children use video conferencing they discover language. It suddenly makes sense.'

*Headteacher - French link primary school*

'Through the use of video conferencing technology, the curiosity of both sets of pupils had been aroused and productively used to improve their learning.'

*Head of Geography - Secondary school working with a Year 7 group*

'The children . . . were inspired to write letters, cards and invitations and to draw maps, plans and diagrams. Children are still talking about it over six months later.'

*Headteacher - Primary school following activities with reception children*

It is clear from schools we have worked with on the 'Video Conferencing in the Classroom Project' that video conferencing has a significant impact on the motivation of students of all ages and that teachers are in no doubt that this has had an impact on their learning.

It goes beyond the novelty effect. Students quickly appreciate if a new technology offers them anything, and the experience in schools suggests they do see that video conferencing can add to the learning experience. This is evidenced by the fact that, in many cases, students are keen to initiate, plan and manage conferences themselves. After all, many students will have video communications on their mobile phones and they will be at ease with communicating in this way, so let's continue to demonstrate and encourage its use for learning as well as entertainment.

More work needs to be done to evaluate issues such as impact on teaching and learning styles, where videoconferencing is most effective, and classroom management. However, as with all technologies or e-Learning tools, it is the skill of the teacher that is the most important factor in its success.

We hope that this book demonstrates the huge potential of videoconferencing as a tool to support teaching and learning in the classroom and beyond.

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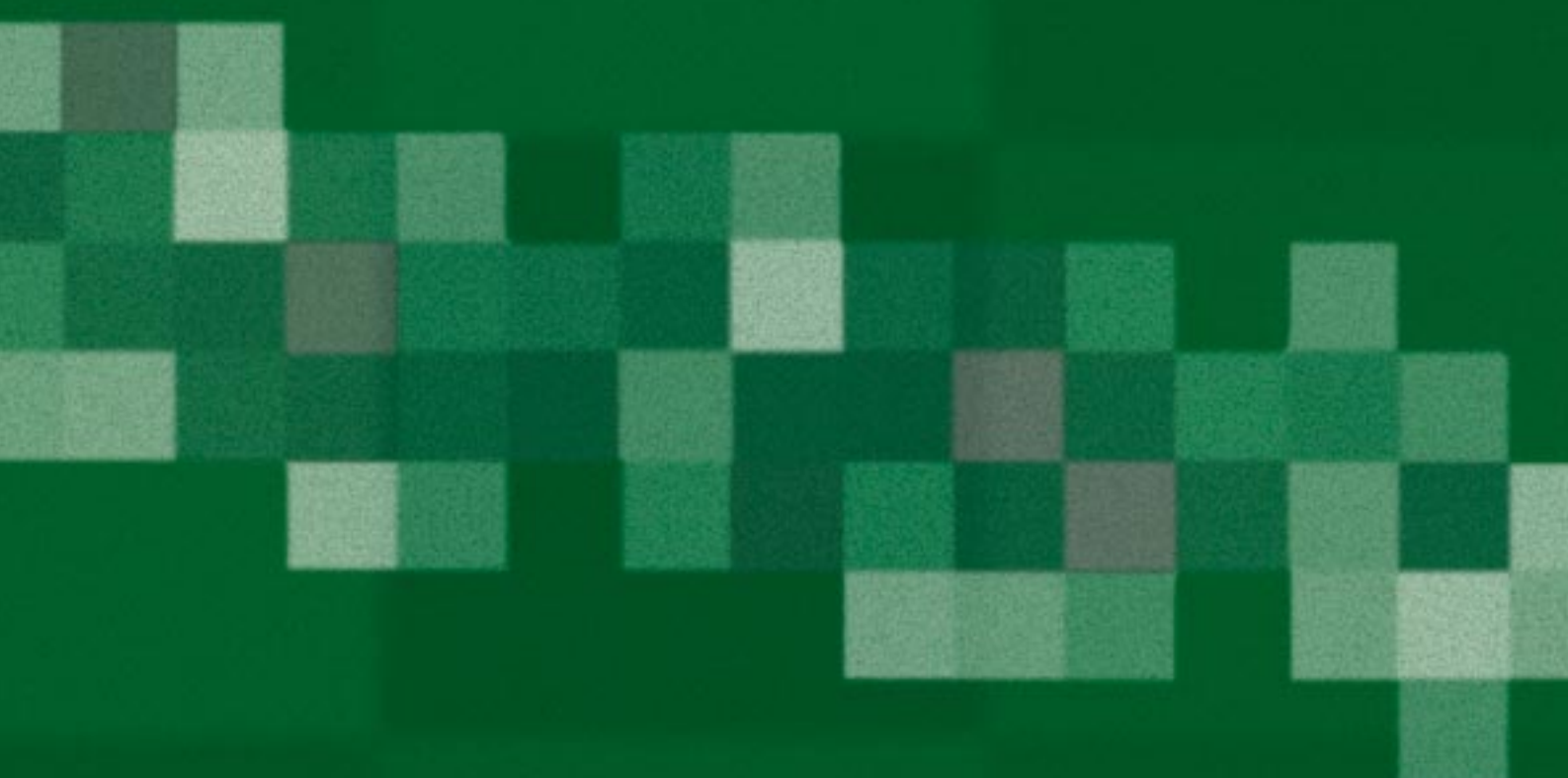
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