# Filming Fundamentals

A Guide for Teachers using the "Eureka Moments" Classroom Action Pack

## The equipment

The equipment is less important than the project idea, but obviously you'll need video recording and editing equipment that's of sufficiently high quality and which is up to the job. In essence, you'll need:

- A good quality, reliable video camcorder (preferably digital);
- A sturdy, modern tripod (for stability when recording), and
- A modern, fast computer (either Apple Mac or Windows PC) into which your video footage will be imported for the creation and output of the final edited video sequences.
- Videocassettes (either MiniDV or Digital-8 as appropriate to the camcorder format being used) and other consumable items such as blank CD and DVD disks (where appropriate) in order to store and distribute edited media files.

### Choosing a camcorder : What do we need?

There are several recording formats available, some of which are instantly recognisable due to the length of time we have been using them. VHS will be known to almost everyone as a tape recording that virtually every home and school will have. In addition to home video recorders, VHS is still used in camcorders – in both the full-size format and also as a smaller "cut-down" cassette format called VHS-C. In addition, there are the 8mm tape-based formats such as Video-8 and Hi-8. All of these formats are in common use by people who are quite happy with their output. However, they record "analogue" signals, which means that every time a recording is copied it will lose quality. You can see this effect for yourself if you have ever had to make a VHS copy of a VHS tape. Each progressive "generation" is significantly worse than the last. Infinitely more preferable is to record digitally. Why?

### About digital

When you're asked to copy a computer file from one place to another, you do so without affecting the perceived quality of the data being transferred – no matter how many times you copy it. The reason is that you're simply duplicating a very large string of ones and zeros. A digital camcorder does exactly this, with the result that the information recorded on the tape can be copied many times without any perceptible loss. This is very useful for those wishing to copy segments of their video recordings from one digital tape to another or into a suitably-equipped computer in order to "cut out the unwanted bits" or, better still, the creation of a carefully planned and constructed piece of work. We call this process "editing".

## What types of camcorder are advisable?

There are many digital video formats – most of which are applicable to professional users and which cost a lot of money. At consumer level, there are three main types. They are:

- **MiniDV** (also commonly referred to as "DV")
- **Digital-8** (a Sony format which enables the recording of DV-style signals to lower cost Hi-8 tapes. The recording medium is different but the digital processing and interconnectivity between devices is the same as DV)
- **MICROMV** - a recently introduced format which record to smaller tapes than DV, and whose recordings are not compatible with the other formats.

The most commonly-used format, both in the average home and in schools throughout the world – is **MiniDV**. Camcorders have never been cheaper, and their quality is such that they're highly appropriate to virtually any application within school. Having made recordings with a MiniDV camcorder, users have a much greater chance of being able to exchange recordings with others.

**Digital-8** is a clever invention by Sony which enables users to insert blank Hi-8 or even Video-8 tapes into a Digital-8 camcorder and make digital recordings to the standard of MiniDV. Moreover, many Digital-8 camcorders (though not all) have the ability to play back recordings made on the earlier Hi-8 and Video-8 analogue formats and even convert them to digital as they are being captured into a computer for editing. Digital-8 camcorders are often cheaper than their MiniDV counterparts and, contrary to the opinions of many digital video users, are capable of making digital recordings every bit as good as an equivalent model MiniDV camcorder.

**MICROMV** is a format that was introduced by Sony in late 2001 and which records in an entirely different way to either MiniDV or Digital-8. Instead, it creates a recording format that is very similar to that employed in DVD video disks – namely a method of heavily compressing files using a system called MPEG-2. These small camcorders produce very good recordings. However, because the final format is incompatible with other camcorder formats, in addition to the fact that there are considerable difficulties importing the recorded footage into computers for editing, it is not recommended for general use in school.

## How do we go about choosing a camcorder?

The most important first step in selecting a camcorder is to decide what it will be used for. In the context of a project like *Eureka Moments*, the camcorder will be used primarily for recording good quality image sequences and, in some cases, the natural sound that occurs during recording. The first thing you'll need to look out for is the picture quality that a camcorder can record and reproduce.

### Picture Quality

A digital video camera uses a CCD (a Charge Coupled Device) to turn the incoming light waves using a "chip" onto which the light falls which then converts the image into pixels (picture cells). Put very simply,

the larger the CCD and the more pixels they produce, the higher the quality of the resulting images will be produced. This, a camcorder whose CCD produces a resolution of 800,000 pixels will generate higher quality images than will a comparably-sized CCD chip capable of producing only 400,000 pixels. Some camcorders (and nearly all professional ones) use not one CCD but three, each of which is dedicated to processing one of the three primary colours – Red, Green and Blue. A 3-CCD (three-chip) camcorder whose chips each produce a resolution of – say – 400,000 pixels will be capable of resolving images to a much higher quality standard than a camcorder with only a single chip. The downside, however, is that 3CCD camcorders are generally much more expensive to buy.

**CCD size**

As the cost of consumer digital video camcorders has dropped so dramatically since 2001, so has the average size of the CCDs currently employed by them. It is now common for CCDs to be of the 1/6$^{th}$ inch and 1/4 inch variety, whereas camcorders of two years previous would more likely possess chips of 1/3$^{rd}$ and 1/4 inch sizes. Despite manufacturers' claims , there is a corresponding drop in quality – not so much in bright sunlight, but certainly in conditions of low light such as in darker rooms where minimal ambient light exists during recording. When comparing camcorders, be sure to check not only the pixel-count of a particular model but also the number of CCD chips it contains and the appropriate chip size. In essence, the general rule is that bigger is better.

## Making the right connections

These days, a camcorder isn't just a camcorder – it's quite possible that it will also be a digital video tape recorder as well. How come? Well, many digital camcorders now possess the ability to accept video and audio signal in as well as being able to send signals out. You may have connected a camcorder to a VHS recorder or to a TV set in order to play back what you've recorded and to re-record the contents to a VHS viewing tape. It's also possible to record video directly into the camcorder from another device (such as another camcorder, VHS or even straight from the TV). In order to facilitate this, the camcorder needs to have recording inputs. They can be what we call "DV-in" or "AV-in". What do these terms mean?

- DV-in: This is a digital camcorder whose FireWire/i.Link socket can accept signals into the camcorder as well as sending them out.

- AV-in: This is a digital camcorder whose analogue connectors (the same ones to which you'd connect cables to view the tape on a TV set or copy to VHS) are wired to receive signals into the camcorder. This is usually in addition to the DV-in facility, and entails the camcorder electronically converting the analogue signals into digital before re-recording to digital tape.

Having the ability to record video sources back into the camcorder and onto tape is, therefore, very useful if you need to copy older analogue recordings to digital tape for editing or as a means of saving high-quality digital copies of sequences that you have edited within the computer itself. In the case of the latter, we call this "edit mastering".

## Other useful connections

### Headphone socket

It's always a good idea to be able to monitor the sound being recorded by the camcorder as it happens, so a socket for a decent pair of headphones is really essential. If there's any kind of problem – slight wind noise blowing across the delicate microphone or even a problem with the microphone itself – you won't know about it until you're playing it back later, by which time it might be too late. It's much better to monitor the sound as you record. For this, you'll need a camcorder that has a headphone socket. All such sockets are standard 3.5mm stereo jacks of the same size as those used in Walkman style systems.

### External microphone socket

There will be times when the camcorder's built-in microphone will not be good enough at recording people's conversations or actors' dialogue to a good enough quality. If you're likely to be recording people talking (perhaps in interview or straight to camera) it's a good idea to buy one or two low-cost tie-clip microphones. These are so called because of their very small size, and because they can be clipped inconspicuously onto a person's clothing in-vision. Usually battery operated, they will simply connect to the 3.5mm external microphone jack socket on the camcorder (assuming it has such a connection). Other microphones, such as directional microphones (sometimes called "rifle" or "shotgun" mics) will make it possible to record sounds in front, or in the immediate vicinity, of the camcorder. These are available in a variety of types, and vary in cost from low (£50) to high (several hundreds of pounds). A good medium-priced directional mic is the Sennheiser MKE300D microphone, which will mount onto the camcorder's accessory shoe and costs in the region of £120. The mono (not stereo) plug will then connect to the camcorder's external microphone socket. It should be noted that Sennheiser makes high quality microphones for use in professional film and television production, and it's worth buying the best quality microphones possible since your viewers will tend to notice bad quality sound before bad quality images.