Using Multimedia in the Classroom

A Guide for Teachers
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Prepared by

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What is Multimedia?

In the field of education, we have long used media, sometimes referred to as “audio-visual aids”, to help in our teaching. These have been many and varied, and have included things like movies, videos, slides, audio tapes, overhead transparencies, along with various sorts of equipment such as cameras, recorders and television monitors.

The term “multimedia” is a relatively new word that is used to describe a combination of different media, all being used to best describe or explain something.

Technically speaking, a movie projector or video tape player is a multimedia device in its own right, since it combines two or more media forms already - pictures plus sound.

In recent times, however, the computer has dominated the scene, and we are now at the point where these remarkable machines can do just about anything that all the previous things were able to do. So if you have not had to go through the “learning curve” of old-fashioned and out-of-date technology, then you have a real advantage.

What is Digital Multimedia?

When all of the things that we want to use are converted into a digital format, then we call it digital multimedia.

The Raw Bits

These are the various bits and pieces that are combined together to make the final multimedia project. Let’s consider some of these. You will find a tabulated summary of these on pages 3-4.

Text files: These are normally word processor documents that are typed into a computer. They can also be produced by scanning text from a book or elsewhere and then putting them into a word processor file.

Text files have file extensions like .doc, .txt, .rtf, etc.

Drawing files: Clip art and similar drawings are available from many sources, including the internet and various software libraries. Some programmes come with a collection of freely available clip art.

If you have a drawing programme on your computer, you may also be able to create your own files. But be aware that some of these programmes take quite a long time to learn.

Picture files have extensions such as .wmf, .png, .dwg, and many others.
Photographs and pictures: Digital photographs are now very common and can be made yourself on almost any digital camera. The tricky job is often getting these into a computer where they can be incorporated into a multimedia project. The best advice we can give is for you to follow the instructions that came with your camera. Photographs can also be scanned into your computer in the same way as pictures.

Digital imaging software can be used to alter your pictures. Sometimes this is supplied with either your camera or computer. Once again, it may take some time to become proficient in the use of this.

Photograph files have extensions such as .jpg, .tif, and others.

Sound recordings: CDs are probably the most common form of digital recordings, but now it is also possible to make simple digital voice recordings on a number of devices, including the computer of course.

The old-style cassette tape recorder is now replaced with a modern digital machine that records straight to a computer storage device such as a hard disc.

The most common sound files have extensions like .wav or .wma.

Videos: Most video production work is now done digitally. The videotape is very rapidly becoming a thing of the past. In many countries now, even the broadcast television channels transmit digital signals to TV sets, and in the near future it is likely that the old non-digital sets (called analogue receivers) will become obsolete.

And we are all now familiar with DVDs of course.

For any who want to produce their own digital video recordings, the latest generation of camcorders enable you to do this.

Popular video file formats have the extensions .wmv, .avi, .mpg and many more.

Animations: Animations are like cartoons. They are pictures or other objects that move. They could also be moving text. Animations can be very useful in multimedia programmes, but they are difficult to create and the creation process is very time-consuming. The file formats are usually the same as for videos.

Diagram 1 on the next page summarises all of the media mentioned above.
### Diagram 1: A summary of media types

<table>
<thead>
<tr>
<th>Media</th>
<th>Non-digital format</th>
<th>Digital format process</th>
<th>Digital production software examples</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print materials</td>
<td>Hand written or typed</td>
<td>Word processor on a computer</td>
<td><em>Microsoft Word</em>. Part of the <em>Microsoft Office</em> suite of programmes.</td>
<td><em>Microsoft Office</em> is quite expensive, although educational discounts can be obtained.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Open Office Writer</strong>, Part of the <em>Open Office</em> suite of programmes.</td>
<td><em>Open Office</em> is available free and does basically the same as <em>Microsoft Office</em>. You can get it as a computer download.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Books or other printed</td>
<td>Scanning using **Optical</td>
<td>Most scanners come with this software</td>
<td>With <strong>OCR</strong> software you identify an area of text and it is then scanned into your word processor page. It needs to be checked for accuracy, since errors are quite common, particularly if the original is not perfectly clear or contains unusual fonts or characters.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Character Recognition</td>
<td>supplied. It needs to be installed on the computer and you must have a word processor installed as well.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(OCR) software</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drawings</td>
<td>Hand drawn artwork</td>
<td>Computer drawing on a computer</td>
<td><strong>Adobe Illustrator</strong> is probably the best available.</td>
<td>This is quite a difficult programme to use and to learn it can take some time. It requires a basic knowledge of graphic design in the first place.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Open Office Draw</strong>, also part of the <em>Open Office</em> suite.</td>
<td>This is an excellent programme and is free. It produces simple drawings and shapes quickly and easily. These can be incorporated with other documents.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Inkscape</strong> (open source)</td>
<td>Free and relatively easy to use. But as with others, a basic knowledge of graphic design principles is desirable. This software can be downloaded from the internet.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Clip Art</strong> collections or downloads from the internet.</td>
<td>There are many collections of clip art available, costing up to several hundred dollars. There is also a huge amount of art available on the internet, but you need to be careful about copyright restrictions with this.</td>
</tr>
</tbody>
</table>

Available computer drawings
<table>
<thead>
<tr>
<th>Media</th>
<th>Non-digital format</th>
<th>Digital format process</th>
<th>Digital production software and hardware</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photographs and other images</td>
<td>Taken with a film camera</td>
<td>Taken with a digital camera</td>
<td>Software comes with most cameras that will facilitate transferring the images from the camera to the computer.</td>
<td>Check that you can use the software. The photograph files will need to be re-named when they are in the computer.</td>
</tr>
<tr>
<td>Appearing in books and other documents</td>
<td>Scanning with a digital scanner attached to a computer</td>
<td></td>
<td>The same applies for scanners as cameras. All are slightly different in the way they operate.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Image manipulation</td>
<td></td>
<td><strong>Adobe Photoshop</strong> is a programme that allows you to make changes to photographs and scanned images.</td>
<td>As with other Adobe programmes, this requires a lot of practice in order to become proficient.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Photoshop Elements</strong></td>
<td>This is a scaled down version of <strong>Adobe Photoshop</strong> that enables a lot of simple changes to be made to photographs and scanned images. It is sometimes provided free with a new computer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Gimp</strong> (open source).</td>
<td>Similar to <strong>Photoshop</strong> and available from the internet.</td>
</tr>
<tr>
<td>Sound recordings</td>
<td>Tape recordings made with a microphone and tape recorder</td>
<td>Digital recordings on to hard disc</td>
<td>Software supplied with the recording device. This should allow the files to be transferred to a computer.</td>
<td>You may also also be able to plug a microphone directly into the computer to enable recordings to be made.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Adobe Soundbooth</strong></td>
<td>Modem computer software allows sound mixing and controls that were only previously possible in an advanced sound studio. One example of this is <strong>Adobe Soundbooth</strong>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>This is not an easy programme to learn, and is probably not of much use in normal educational settings.</td>
</tr>
<tr>
<td></td>
<td>Pre-recorded tapes</td>
<td>CDs and solid state devices such as iPods and MP3 players</td>
<td>Modern computers may be able to record directly on to the computer hard disc using the sound card and software inside the machine.</td>
<td>Check what your computer can do in this regard. It could be like the microphone recording (above), in that there is a plug there that lets you make recordings this way.</td>
</tr>
<tr>
<td>Media</td>
<td>Non-digital format</td>
<td>Digital format process</td>
<td>Digital production software and hardware</td>
<td>Comments</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------</td>
<td>------------------------</td>
<td>------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Video recordings</td>
<td>Video tapes (in various formats) using a video camera</td>
<td>DVDs and some solid state devices that are built into a camera.</td>
<td>Modern video cameras do not use tape any longer. Instead they record on to either a DVD directly or to a hard disc.</td>
<td>Tape recordings have always been a problem in humid climates. The tapes themselves can quickly build up mould and dust which causes them to become jammed in the machines. This then can cause further damage to the machines themselves. The modern systems can usually connect directly to a TV monitor for viewing, or to a computer if you want to edit the recording you have made. Again, these are not the easiest programmes to use, but they are lots of fun! You can also do things like add titles or subtitles, change the sound track, and insert various special effects.</td>
</tr>
<tr>
<td>Flash Movies: These are designed mainly for internet use.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animations</td>
<td>Cartoons</td>
<td>Computer generated animations</td>
<td>There are a number of software programmes that are used to create animation effects. These include Adobe After Effects and also Flash. An even more versatile programme is Adobe Director (formerly called Macromedia Director). This is the one that is frequently used to create things like computer games and simulations.</td>
<td>Any sort of animation requires a sound knowledge of graphic design and animation principles. Extensive training is needed in order to become truly proficient in their use. People who are experts in using this kind of software are in big demand.</td>
</tr>
</tbody>
</table>
3. **Tying it all together with a computer**

So we now have a very general overview of all of the bits that can be used to create a multimedia production. And to link them all together we need to have a computer.

**What sort of computer?**

To actually produce multimedia yourself, you do need to have a fairly powerful computer, along with some quite sophisticated (and possibly expensive) software. This is the kind of equipment that the EBU in MESC is now being equipped with.

Later in this manual we will list the sorts of technical specifications that are needed for a computer like this.

But to replay multimedia materials that have already been created, the requirements are not so great. Most multimedia developers will want to ensure that the final product is something that can be seen and used by as wide an audience and on as many different computers as possible.

4. **Some examples of multimedia**

**Desktop publishing**

This is really a misleading term, but it is one that is commonly used to describe a range of software that started to appear in the mid 1990s. It is not actually “publishing” software since things are not published on the desktop, but it is a very useful and powerful tool that enables the user to prepare materials ready to be published - either on a printing press or simply photocopied.

So it is actually a graphic design and layout tool.

But we can refer to it as multimedia, since it does enable more than one of the raw bits that we talked about earlier to be combined together.

This Guide to the use of Multimedia, for example, has been prepared using the software called InDesign, one of the most widely used pieces of desktop publishing software.

What desktop publishing enables you to do is combine text and images (including pictures, drawings, photographs, graphs, charts, tables, etc)
together in the one document and them move them around the page so as to make them look attractive and easier for the reader to use.

You can manipulate the text so as to:

- make it fit into a given space
- change the font style
- change the size of the font
and many other things as well.

You can create the text inside the programme itself or you can import it from some other programme, such as a word processor.

And you can also import (ie place into the document) graphic materials of many different types, and when they are there you can:

- change their shape and size
- move them about the page so as to give the desired effect
- put them under the text
- rotate them

and lots more, depending on the programme you are using.

To become a good desktop publisher, you need to have a good knowledge of design and you need to know what works well in terms of layout. It is very easy to make a real mess of the layout unless you are careful.

Some of the best known desktop publishing software programmes are:

- Adobe InDesign (probably the best)
- Adobe PageMaker (now replaced by InDesign, but still used quite extensively)
- Microsoft Publisher (lacks many of the features of InDesign, but still quite popular)
- Microsoft Word (really a word processor, but the most recent versions have many of the features of a full desk top publishing programme)
- Open Office (a free alternative to Microsoft Office) has a programme very similar to Word. It is called Open Office Text Document and has most of the features of Word.
- Scribus is another open source programme (ie it is available for free) that you can download from the internet.
Presentation software

Presentation software is also a form of multimedia. The most common one around is probably *Microsoft PowerPoint*. Again, the software enables pictures and text to be combined in the one place, but this time we have the added possibility of incorporating both sound and movies.

Really effective presentations also depend on good layout and design. It is well worth while noting those you see that are impressive in this respect, and try to remember those features that make it good. Then try to incorporate them in your own presentation.

- A free alternative to PowerPoint is the *Open Office Presentation* programme. This programme will also create presentations of a multimedia nature and will also open most presentations that have been created in *PowerPoint*.

It is important to remember that presentation software is really intended for showing to an audience. They do work for individual viewing of course, but their main purpose is to present things to a group, usually as support for a spoken commentary.

If you have a large amount of information that you want to convey, it is better to use another method, such as a PDF file. That is what we will discuss next.

Portable Document Format files

PDF files, as these are generally called, are produced from other documents that have been created in other programmes. Most desktop publishing programmes, as well as word processors and presentation programmes, enable you to export the finished file as a PDF document. The word “export” means that you can convert the file into PDF form.

The main advantage of a PDF file is that it can be viewed on almost any computer, provided that the software known as *Acrobat Reader* is installed on it. And *Acrobat Reader* is available for free.

But PDF files have some other features as well:

- They can link to other multimedia elements such as sounds, videos, internet sites and other files. But to make these links you need to have a more advance version, known as *Adobe Acrobat*, installed. And this is not free.
- PDF files are quite difficult to edit or change once they have been created. For this reason they are often used in situations where you
do not want the reader to be able to alter them.

- They can also be made in varying file sizes. If the file is to be distributed via the internet, for example, its size needs to be small, so that it can be downloaded easily by a viewer. The quality of the image will be not as good in this instance. But if you are wanting to produce a high quality printed book from your PDF file, then the size - and the clarity of the images and text - will need to be greater.

## 5 Interactive multimedia

Where the user of an interactive media project or programme is able to interact with it, then we have what is called interactive multimedia. In education, this can be a very powerful learning tool when used in the right way. Here are just some of the possibilities for this sort of interaction:

- A link from the main programme to another file which may be in another format. Note that in order to run this linked file, it may be necessary to have additional software on the computer.
- A link to a page that should be printed out. For example a test or assignment sheet. The sheet could be in Word or a similar word processor format that a user could fill in electronically. Or it could just be a print out that is completed by hand.
- A page in the programme could offer choices to the user, asking them to select which option they would like to take.
- An extension of the above to enable a student to select an answer from a range of possibilities, and then having the computer respond with a comment if the wrong choice is made (or the right one).
- A link from the programme to an internet site where more information can be found. Be careful with these, however, since internet sites can disappear without warning and the link may just go nowhere.
Delivering multimedia

The ways in which the multimedia materials can be delivered are many and varied. Usually it will dependent on the people that are viewing the production, and also, of course, on the available equipment.

The picture above shows a common setup. It consists of a standard computer, along with a monitor, keyboard and mouse. If there is sound involved, you will also need some speakers attached to the computer, as well as a “sound card”. This is something that is plugged into the computer itself and some older machines may not have one supplied. Check with your IT person.

Computer laboratories

This arrangement is fine for individuals or small groups of students. It is the sort of arrangement you might well find in your school’s computer laboratory.

The photograph below shows students at Avele College working with just this type of arrangement.
The photo above was taken at Chanel College, where there is a whole room set up with computers.

But clearly for this sort of setup will not be much good if you want to show or demonstrate something to an entire class. The screen is too small for all to see.

If you want the whole class to see what you are doing, then a better arrangement is to use a data projector. Here is one in use at Amoa College on Savai’i. This well-equipped computer laboratory has 24 computers for individual student use as well as one for the teacher that is attached to the data projector for whole class demonstrations.
**Multimedia on the move**

A more flexible setup might be to use a laptop computer linked with a data projector. This could then easily be moved from classroom to classroom, thus eliminating the need to have to move a class to the computer lab every time you want to show them something.

The picture on the right shows how the connection between the two is usually made. Unfortunately, not all laptops and projectors are the same, so you really have to check the operation manual for the equipment you have in order to be sure you get it all correct.

The other things you might need are:

- a screen on which to project the image, but maybe you could just use a blank wall of the classroom - modern projectors work quite well even in normal daylight
- a set of speakers if there is sound needed.
**Mobile workstations**

An alternative to this laptop/projector system is a regular computer fitted into a cabinet or trolley on wheels, so that it can be moved from room to room as need be. Here are some pictures of cabinets that are available overseas. It would be quite simple to have one made in Samoa, preferably fitted with some sort of locking device for safety and security purposes.
Computers for multimedia

As technology gets more sophisticated, so the demands placed on a computer that is being used for multimedia purposes also increase. If you are going to get new computers, you need to ensure that they meet certain minimum specifications. Some things might work on older machines, but perhaps not as well as they should. This applies particularly if you have video involved.

So here are some recommended minimum key specifications that we recommend for any new computers you get (either laptop or desktop). Our apologies if this is getting a little bit technical.

- **Main Processor:** Intel Pentium or equivalent (there are quite a few that are equivalent these days, but older Intel 386 or 486 processors will struggle with modern multimedia).
- **RAM:** At least 1 GB of RAM (Random Access Memory). Most new computers have a minimum of 2 GB.
- **Hard Disc:** At least 80 MB of hard disc storage space. You may not ever use all of this, but it pays to some spare space “just in case”.
- **Optical Disc Drive:** The unit should have a combined CD/DVD drive (sometimes called a “combo” drive), preferable one with both read (playback) and write (recording) capability.
- **Other features:** Sound card with speakers, internet capability, graphics card, at least 2 USB connectors, keyboard, mouse, etc.
- **Operating System:** Most new computers now come with Microsoft Vista as the operating system. This is now being replaced with Microsoft Windows 7. Most of the materials we produce will also run perfectly well with earlier operating systems such as Microsoft Windows XP or Windows 2000.
- **Monitor:** As big as you can afford, and with the highest resolution (clarity) possible within your budget. As a guide, look for at least 1360 x 768 pixels at least. The monitor is normally sold separately from the rest of the computer so you need to ensure that the computer itself is compatible with the monitor. And if you are getting a new one, be sure to get the LCD (flat screen) type.

**Laptops**

Laptops are now becoming much more common, and their quality is now every bit as good as a full desktop machine. And, of course, they are much more versatile in terms of their portability.

But beware - they are also more attractive to thieves and other criminals, so be sure to keep them in a safe place at all times.
Computer costs

It might be useful to let you know the sorts of costs that are involved in buying a computer today. The good news is that they have come down a lot in recent times.

A good (new) desktop computer will cost you about NZ$900, and a monitor about NZ$350 if you purchase them in New Zealand. Unfortunately, suppliers in Samoa tend to charge a lot more.

A laptop computer will be slightly more expensive, although their cost is dropping.

Software

Some computers come already loaded with software. Certainly they should have the basic operating system installed. But if they don’t have anything else, then you’ll need to get some. Here’s a suggested list of what you’ll find useful:

- Microsoft Office, basic version. Be sure to get the educational discounted price.

  or

- Open Office, which you need to get from the internet. You log on to the site http://www.openoffice.org.nz/ and then follow the instructions. And it is free.

- An antivirus programme to protect your computer. You might have one provided, but it may work only for a limited period of time. The most popular antivirus programmes are probably Norton and McAfee. Both cost money.

  A free alternative is AVG, and it is also available for free from the internet site: http://free.avg.com/
Other equipment

Some other items that you may find in a school include:

Data projectors

These are a very useful thing to have, since they can normally be moved easily from one room to another. They also work well in normal lighting conditions.

Data Projectors can be linked to a computer or to a DVD player. They do not usually have sound built into them so you will need to check this out if you are going to use it to show videos that have sound tracks.

Be aware also that the quality (resolution) of the image from a data projector is not usually as good as that on a computer screen. Different projectors have different resolutions, and the better the resolution, the higher the cost. You should be able to buy a reasonable data projector in Samoa for about WS$2500.

Special care needs to be taken when looking after this equipment. When they have been used for a while they get quite hot. It is very important that you let them cool down properly before moving them. The lamp source is very delicate and can been easily damaged if moved while still warm.

DVD players

DVD players are nowadays very cheap to buy. You can certainly get a new one for under WS$100.

But you should note that these machines are designed to replay DVD movies only. They will not work with interactive DVDs like those used in computers.

Mobile devices

Mobile phones and similar devices such as iPods are becoming used as learning tools in many overseas countries. Such uses of technology have not yet become common place in Samoa, but they might well do so in the future. As media storage becomes much more compressed and as communication methods become more and more based on mobile technology, then things like podcasts (broadcast radio programmes, text messages and sometimes video using cell phones).
Using multimedia in your class

Using multimedia materials in your class can be fun as well as educationally beneficial. You can use short segments to add visual impact to your lesson and bring a sense of reality into the classroom. Here are just a few ideas:

- Show students how the theories of science are actually being used in Samoa, e.g., look inside a power station, see renewable energy sources being used, see the different breeds of chickens that are found in the country.
- Print out student work sheets or assignment tasks for them to work on.
- Allow faster students to work by themselves, exploring the resources and researching materials for their study.
- **Multimedia resources and computers are not just for computer studies.** The technology has much wider use than that. Today, computers can assist in every area of the school curriculum. Whether we like it or not, the technology of computers, along with the huge changes in communication technology, look like being with us for a very long time yet! So tomorrow’s teachers must be prepared to spend time coming to grips with just what it is all about.

The big problem is, of course, how to get the multimedia information to the students. How you can do this will depend on a number of things:

- How accessible is your computer lab? Can it be made available for students in general subject areas such as science and mathematics?
- Can students use the facilities after school or during class breaks?
- Has your school considered getting a mobile computer lab?
- What would be the best way in your school to manage the multimedia materials themselves? Maybe in the library? Or in a staff safe place?
Interactive e-Books and multimedia

One method we are using to make multimedia resources available here in Samoa is to develop what are referred to as interactive e-Books.

Essentially, these are electronic books that are based on the textbooks used by most secondary schools in the country. Here are the covers of some of them.

The electronic version of these books are in the form of PDF documents. So you will need Adobe Acrobat Reader on your computer in order to be able to view them. Each book is on one DVD.

In the next section we will explain how to use Acrobat Reader.

The pages in the electronic books look very similar to the ones in the printed books, but we have made a few changes to them. The changes are simply to enable you to use the multimedia resources that are included with the DVD. We have added notes down the side of the page and “click here” buttons in the form of icons to take you directly to the resource.

As a teacher, you are free to choose whether or not you want to use any of the resources included. But it is well worth while you taking a look at them anyway.
Opening an e-Book in Adobe Acrobat

When you put the DVD into a computer, it will come up with a message asking you to do something. The exact message will be different depending on the actual computer you have, but most probably it will look like this:

Click on the “Open folder to view files” option and you should get to another screen that will look something like the next picture.

Note that this will also vary depending on the setup on your computer.

The file you are looking for is the one with the book name on it. You should be able to recognise it.

Double-click on the file name and it should open in Acrobat.

The other folder called “Linked Resources” contains the individual multimedia resources themselves.

Next we will look at some of the basic operations that will enable you to navigate your way around an Acrobat document. If you have used this in the past, you will be quite familiar with them, but we thought it worth while including them again.
Navigating a PDF

Clicking on this icon opens up a side menu where you can see miniature versions of each page. You can click on any page to go directly to it.

PDF stands for Portable Document Format. These are files that are created using special software such as InDesign, and then converted to a file that will run on a computer that is equipped with Adobe Acrobat Reader.

These controls adjust the size of the page on the screen. Try clicking them to see what effect they have.

These two arrows let you go from page to page, forwards or backwards. And the number shows just which page you are looking at.

These are files that are created using special software such as InDesign, and then converted to a file that will run on a computer that is equipped with Adobe Acrobat Reader.
There is an excellent Microsoft PowerPoint presentation here that shows the various forms of energy. It has been modified from the original so as to make it a little more "Samoan" in content. It would make a good introduction to Unit 4 or you could use it in conjunction with the text.

Click the button to access the presentation. Alternatively you can view it as a PDF file by choosing the second button.

Alternatively, you might like to look at this Adobe Acrobat document that also shows the various forms of energy. It does the same thing, but is a bit more sophisticated in its approach. It makes reference to a textbook at the end that you may be able to locate.

Beware of the links to web sites on the last page - they may no longer work!

Click here to access the document.

This whole section relates to the strand: World of Physical Phenomena, on page 34 of the Science Curriculum document. You will also find the relevant Achievement Objectives on page 40. This link will take you directly to that page.

**Unit 4: ENERGY**

**Introduction**

In this unit you will learn about potential and active forms of energy.

**What is energy?**

Everything around us is either matter or energy. Matter is easy to talk about because it can be seen, touched and made. Energy is much more difficult to talk about because usually it cannot be seen or held. Energy is something that can make things move or change. Every time something moves or changes energy of some sort is involved. There are lots of different types of energy. Energy can be changed from one type to another. Energy can only be detected when it is changing from one type to another.

**Activity 1**

**What is Energy?**

(A) To record ideas about energy.

1. Read the information above on what energy is. Then write down four main points from the information.
2. Draw a flow chart showing the main ideas and how these ideas are linked together.
3. Share your ideas with the class.
4. Review the ideas from the whole class by grouping similar ideas.

Energy can be divided into two groups. The first group is stored energy called potential energy and the second group is called active energy.

**Potential energy**

Some examples of potential energy include gravitational, chemical, elastic, nuclear and magnetic energy.
Other resources

There are many other multimedia resources available to teachers in Samoa, and some of these are indicated in the interactive e-Books. Because of the space limitations on the DVDs, it is just not possible to include them all.

However, they are available to you, and most are free of charge. MESC are setting up a catalogue of these and this will hopefully be available both on their web site and also on request from the Educational Broadcasting Unit. It is also planned to have some of the resources available in local resource centres, as well as through the SchoolNet project.

And then, of course, there is the internet. This is, without a doubt, the biggest resource of all, and is capable of providing a wealth of learning experiences to all students.

But it is probably the subject of a whole separate training course, and hopefully you will all soon become familiar with its capabilities and uses.
12 Planning ahead

If you want to use some multimedia resources in your classroom teaching, there are a few very basic things that you need to address, and some key questions that need to be answered. Here they are, in no particular order, along with a check-box so that you can tick them when you are sure that they are completed.

Are there resources that I can use for this unit/topic?

☐ Check with the relevant Interactive e-Book. Is anything indicated there?

☐ Is there anything on the Ministry web-site or in the SchoolNet or EBU listings that would be suitable. If so, how can I access it?

☐ Does the school have any resources available - possibly in the library or school resource centre?

☐ Is this what I want?

☐ Is this something that needs to be shared with the whole class - or is it more suitable for individual or small group learning?

☐ How do the multimedia resources relate to my planned lesson(s) on this subject? Do they fit in exactly with what I want to do, or do some changes need to be made to my lesson planning?

What are the students expected to do after using the resource?

☐ Write down some notes of their own?

☐ Partake in a discussion?

☐ Complete a worksheet? Do I make my own or use one that is provided?

☐ Undertake a project of some sort - either individually or as a group?

☐ Do some further research or homework on this topic?

Other planning issues

☐ Do I need to book a computer room or equipment in order to be able to use this resource? Am I fully aware of the school policies in this regard?

☐ Will it be available exactly when I want it, or will I need to make some timetable changes in order to be able to get access to it?

☐ Is the equipment set up and ready to use, or do I need to check it in advance (always a good thing to do)?

☐ Do I need to have any forms or other student materials copied before the lesson?
13 Issues in using radio and television broadcasts

There is no doubt that broadcast radio and television programmes can assist in teaching. For many years now, these have been used in countries throughout the world to great effect. Here in Samoa, the Educational Broadcasting Unit (EBU) have been transmitting school broadcasts for primary schools successfully for a very long time.

In American Samoa, educational television broadcasts were used between 1964 and 1970 to transmit programmes to schools throughout the islands. They were then phased out.

The main issues that surround the use of these broadcast media in classrooms are:

1 The programme schedule needs to be planned in advance and made available so that teachers know just what is coming up and when. They also need to know how the materials can fit in with planned teaching.

2 Teachers have to arrange their teaching programmes so as to accommodate the materials they want to use. Particularly in the case of television, this might mean moving classrooms or negotiating with teaching colleagues to share the equipment at a particular time.

3 If your class is listening to or watching a live broadcast, then you have essentially handed your class over to the radio or television “teacher” for that time. You need to know what they are learning, and how you are going to follow up afterwards.

4 There may be some instances where you might want to record the broadcast for later use. That is good and means that you have more flexibility as to when you actually use the materials.

5 Not all schools will be able to get good reliable reception of broadcasts. There is nothing worse than students having to struggle to hear clearly, or problems in seeing the TV image clearly. In these cases it may be worth considering getting a copy of the original broadcast from the station who transmitted it, preferably as a CD or a DVD. This may cost money of course.
Maintaining and servicing multimedia equipment

Careful treatment of multimedia equipment is vital if it is to remain operational, particularly in tropical environments like we experience here in Samoa.

Let’s consider some of the factors that need to be taken into consideration.

Storage location

Computers and other multimedia equipment need to be stored in a safe place. They are attractive items and should be kept in a locked room or cupboard.

The place should be kept clean and dust-free. If dirt and dust does get into this sort of equipment it can cause severe damage. Some people like to put a light cloth over the equipment to cover up the ventilation holes when it is not in use. Be sure to remove it before use, however.

Air conditioning is not essential for the storage of equipment. The problem if equipment is kept in an air-conditioned space and then taken out into a hot and humid room for use, is that water can condense very quickly on to the electronics, and this can cause more harm. The best storage locations are those that are de-humidified. They have reduced humidity, but the temperature is the same as the room(s) outside. So condensation on the electronics does not take place.

Storage of the materials (or software) is much the same. The old-style videotapes and audio tapes are a real problem. In the tropics they tend to deteriorate very quickly in heat and humidity. The machines needed to replay them also have lots of moving parts, rollers, pinch wheels and the like, and these are very susceptible to wear and tear.

Routine maintenance

A certain amount of routine maintenance is needed to ensure your computers and other equipment is always in the best operating condition. Modern flat screen LCD monitors needs special attention. Follow the easy steps below to safely clean your flat screen monitor in just a few minutes.

1. Turn off the monitor. If the screen is dark, it will be easier to see the areas that are dirty or oily.

2. Use a dry, soft cloth and very gently wipe the screen. A great choice would be the microfiber type of cloth used to clean eyeglasses. See Tip #1 below for kinds of cloths to avoid.

3. If the dry cloth did not completely remove the dirt or oil, do not press harder in an attempt to scrub it off. Pushing directly on the LCD screen can often cause pixels to burn out.

4. If necessary, dampen the cloth with distilled water or with an
equal ratio of distilled water to white vinegar. See Tip #2 below for products to avoid.

Many companies also sell small spray bottles of special cleaner for flat screen monitors but the vinegar mixture is usually just as effective.

5. The plastic edge that surrounds the screen can be cleaned with any multipurpose cleaner but take care to avoid contact with the screen itself.

**Tips:**

1. Avoid using paper towels, toilet paper, tissue paper, or something like your shirt to wipe the LCD screen. These non-ultrasoft materials can easily scratch the screen.

2. Avoid cleaning products that contain ammonia, ethyl alcohol, acetone, toluene, ethyl acid, or methyl chloride. These chemicals can react with the materials that the LCD screen is made of which could yellow the screen or cause other kinds of damage.

3. Never spray liquid directly on the LCD screen or it could run inside the monitor and cause damage.

**Virus and spyware removal**

This is probably the most important routine task you need to carry out on your computer. Most of these evil things come in via the internet, but they will also appear if you use an external hard drive or flash drive that is infected. To ensure that they do not get in and damage your computer you must run the detection and removal programme regularly, at least weekly and preferably daily.

An excellent free anti-virus programme is called AVG, and you can download it from the internet. The popular ones that cost you money are Norton Anti-virus, and McAfee, also very good. You also need to ensure that your programme is up to date, and these ones all offer a service, via the internet, that automatically notifies you if you need to update your software.

You do not want to get a virus on your computer. They are very nasty and can cause lots of damage.
Getting your computer repaired

If something really bad happens to your computer and you need to get it fixed by a technician, be prepared to spend some money.

There are a few places in Samoa that will undertake repairs, but not very many - particularly if you have not purchased the computer from them in the first place.

There are a few simple things that you can try yourself in order to help identify the fault if one occurs. Here are some of them:

☐ Check and see that everything is plugged in properly and firmly. The monitor should be plugged into the computer case (except for laptops) and both need to be connected to the mains power. The mouse and keyboard are both then connected to the case also.

☐ If the computer seems to start up but nothing comes on to the screen, then you could try plugging in another monitor, if you have one, to check whether or not the original monitor is working. Monitors do have a limited lifetime, particularly the older style ones.

☐ You could try the same with the keyboard and mouse to try and pin down the source of the problem.