

Digital Projectors



The digital projector allowed the teacher to deliver lessons to the whole class from the PC. One cable connected the computer to the projector, which then projected the computer screen on to the wall. In collaboration with the class, the teacher added in images and graphs to the slides of a presentation. This was a simple, but engaging, task that helped to hold students' attention.

What is a Digital Projector?

Teachers generally use a digital projector, in conjunction with a laptop or desktop computer, to project the computer screen image on to a screen or wall. Further functionality is achieved by the use of an interactive whiteboard (see Advice Sheet 16). Digital projectors are extremely useful and effective teaching tools that facilitate a range of learning opportunities when connected to a desktop computer in whole class teaching scenarios. Projectors are powered by mains electricity and depending on the specifications, are priced from €500 to €1,000, however there is a wide range of quality available and schools should make informed decisions.



Possible Educational Uses

- Highly effective as a means of instruction or demonstration in classrooms, computer rooms, staff training, or parents groups.
- Presenting student work to the whole class.
- Displaying and browsing Web sites in a controlled and collaborative manner.
- Demonstrating or using educational software in a whole class context.
- In conjunction with a TV, video or internet source, a digital projector provides a means of presenting video to student/parent audiences.
- As a means of display/interaction in a classroom situation. Students with special needs can particularly benefit from material being presented visually as it can aid in both information processing and retention.
- Enhancing professional development with staff groups via large screen projection
- Image projection in conjunction with an interactive whiteboard
- Facilitating video conferencing via large screen group participation

Technical and Purchasing Considerations

When purchasing a projector it is recommended to obtain a full demonstration of the unit in the school, so as to be able to better evaluate it's suitability to the school environment. The following are some of the main points to be considered.

Stationary or Mobile

It is useful to consider where the digital projector will most often be used. Will it be stationary or will it be used in different classrooms, school hall or around the school with varying light conditions? If the projector is to remain in one spot, a projector that best meets the conditions of that location can be purchased. Stationary projectors are typically ceiling mounted, and connected by cable to the appropriate PC. In these situations a power socket is needed to be available above the ceiling and close to the projector. If the projector is likely to be moved around, a portable projector that can adapt readily and cope with varying light and screen distance conditions should be purchased. A suitable robust trolley is an appropriate means of transport within the school.

Short Throw or Ultra Short Throw digital projectors

These are relatively new however they are suitable for classrooms and for use with interactive whiteboards. They typically mount on an arm from the teaching wall and are positioned over the teaching position. As a result the teacher or anyone 'up at the board' will not risk looking in to the projector beam, thus concerns relating to possible eye damage, especially where a projector is used a lot in class by teachers and students.

Projection Distance

All digital projectors have a specified projection range. Some cannot focus greater than 5 metres from the screen while higher specification and more expensive models can operate at much longer distances. Brightness also depends on the projector's range — the farther from the screen the projector sits, the less bright the image will seem. These factors should be borne in mind when selecting a projector for the school. A projector with a short throw lens gives a large image from a short distance and can be especially useful in a classroom setting. They are particularly useful where the room is not suitable for typical ceiling mounted projectors. Short throw Projectors are increasingly found in conjunction with Interactive Whiteboards. Projectors with a projection distance range of approx 1-12 metres are suitable for typical classrooms.

Luminosity (Brightness)

The luminosity of a digital projector is measured in lumens and it is the primary consideration when purchasing a digital projector. **According to research by Becta in UK, "Brightness of 1,500 ANSI lumens will be adequate for the majority of classrooms; for many smaller classrooms, 1,000 ANSI lumens will be sufficient"**. Projectors of 1,500 ANSI lumens are also sufficient for use with interactive whiteboards. The brightness of the image displayed is also affected by the amount of light available in the room. Window blinds may be needed to regulate the amount of external daylight entering the room. Modern projectors have two luminosity settings, namely a) standard and b) eco mode. In eco mode the luminosity is set at the lower setting which coupled with lower noise is more appropriate for a regular classroom environment.

Safety:

All data projectors, regardless of brightness, if misused, have the potential to cause eye damage, and hence some simple guidelines should be followed:-

- Ensure that staff or pupils never look directly into the beam of the projector, as this may cause eye damage.
- Users should try and keep their backs to the beams whenever possible
- Use a suitable pointing device during presentations to avoid having to enter the beam of the projector
- If using a portable projector, try and locate it out of the sight line from the screen to the audience; this ensures that, when presenters look at the audience they do not have to stare toward the projector lamp.
- **Projectors of luminosity of over 1,500 ANSI lumens are not recommended for use in classrooms.**
- Schools should consider using Short Throw or Ultra Short Throw digital projectors as they make it easier for someone at the front of a class to avoid being in the line of the projector beam. They are also appropriate for use with interactive whiteboards.

Resolution

The resolution of the data projector is another major factor. The resolution of computer screens has tended to increase in recent years. A computer screen resolution of 800 X 600 is referred to as SVGA, while a screen of 1024 X 768 is referred to as XGA. Data projectors will typically project their own native resolution, but will also compress a higher resolution. This compression will result in some loss of definition. Since most school computers will be the XGA resolution, and nearly all laptops have XGA or higher, projectors with XGA resolution are strongly recommended. A digital projector should automatically detect the resolution and type (analogue or digital) of incoming video signal (from the computer) and adjust accordingly. It may be worthwhile to check different resolutions when purchasing a data projector to see what is the optimum resolution for the classroom.. Most modern projectors do this.

Contrast Ratio

Another image quality indicator to be considered when reviewing a digital projector specification is the contrast ratio. This is denoted in proportions such as 400:1. The contrast ratio indicates differences in brightness in the unit's projection of black and white. The greater the ratio, the more colour detail the projector can show. Schools should seek a contrast ratio of 400:1 or greater, as lower ratios may create less sharp or blurred looking images.

LCD vs DLP Technologies

There are two main projector technologies available when you are considering what type of projectors to get. LCD (Liquid Crystal Display) is the most common type of data projector available. DLP (Digital Light Processing) is a newer technology which used thousands of tiny mirrors to create the image. It is smaller than a LCD projector filling a demand for small light weight projectors. It also produces a smoother video image. Both technologies are suitable for schools.

Lamp Life

The lamp (or bulb) inside a digital projector is key to its functionality and it is important to have information about its lifespan and cost of replacement prior to purchase. Most lamps are preinstalled and manufacturers guarantee them for 6 months or between 1,000 and 4,000 hours of use. The lamp will need to be replaced at some point, so it is worth checking the price and lifespan of individual manufacturers' bulbs. Most lamps have a lifespan of 3000 hours, but some only last 1,000 to 1,500 hours even though they are priced similarly. Some providers will offer a free spare lamp. Replacement lamps (outside of lamp warranty) will typically cost €150 - €300 (inc VAT) depending on the model. A significant factor in how long a projector bulb will operate well is determined by the number of times it is turned on and off during its lifetime, Many projectors have recommended powering off procedures which if adhered to will prolong the life of the bulbs, Alternatively not adhering to these can significantly shorten the bulb life.

Size and Weight

If a digital projector is to remain in one location, its size and weight will not be a key consideration. However, if a school intends to move the projector between classrooms, then weight and size are of major importance. The weight of a digital projector can vary from 2kg to 5kg, and size can vary from A5 to A3. All digital projectors should come with a soft carry case, capable of holding the digital projector and all of its cables and accessories.

Keystone Correction

Keystone correction adjusts for the fact that if a projector is directed towards the screen at an angle, the projected image will be distorted; the edge furthest away from the projector will be wider than the edge closest to the projector. In other words, the image will appear in the shape of a trapezoid. The projectors keystone correction feature can correct this thus allowing the audience to view a rectangular image rather than one with a wider top or bottom.

Noise level /Eco Mode/Brightness

Low levels of projector noise are important especially in smaller classrooms or learning areas. Projector noise is typically caused by the internal fan which is used to cool the bulb. The lower the noise level the better. Levels of 39dBA in normal mode or 33dBA in Eco mode are considered quite good. Switching to Eco mode can also extend the bulb life by reducing the

brightness, associated heat levels, and power consumption. Use in Eco mode is recommended as the lower brightness levels may be more appropriate for regular use especially in classrooms.

Maintenance and Care

When a digital projector is purchased, it is advisable to ensure that all school staff are appropriately trained on how to operate and take care of this expensive piece of equipment. For example, it is important to know that the lamp should be allowed to cool down fully after turning off the digital projector. The internal cooling fan may run for 5 minutes after the machine has been 'switched off' and, after this period, it automatically turns itself off. The projector should not be unplugged until this has taken place.

Security:

Schools should be aware that projectors may be seen as attractive target in schools. Certain models have clear labelling and markings indicating to potential thieves that the projector will not operate without a security code, such features may be useful in a school setting.

Purchasing Considerations

Projectors suitable for general classrooms range from €500-€700, including spare bulb, and projector screen. Better value and lower cost will be obtained if a number are being purchased at the same time. In addition to these costs installation costs will vary also depending on number to be installed, room environment etc.

'Higher brightness' projectors will typically have 2,000 to 4,000 lumens brightness but are not appropriate for classrooms, as they are too bright for regular classroom use. These units may also be used in small halls for medium-sized gatherings. Prices range from €2,000 upwards. More expensive specialised projectors may be required for larger areas. Advice should be sought from a specialised supplier who can advise on projection for larger areas.

Short Throw or Ultra Short Throw projectors may be a little more expensive per unit cost but are generally much easier to install than typically ceiling mounted projectors, and so the over cost may be less than conventionally ceiling mounted projectors.

Relevant Web Sites

Using a Data Projector

www.northcanton.sparcc.org/~technology/Tutorials/Files/Using_a_Data_Projector.pdf

A practical 'how to' guide to assist in connecting and using a digital projector with a computer.

Middlesex University – Using Digital projectors with a Laptop.

www.lr.mdx.ac.uk/comp/gen/pdfs/Data_Projector.pdf

This is a generic guide on how to operate a digital projector with a laptop

Digital Projector

www.maths.unsw.edu.au/computing/compdata.html

The School of Mathematics and Statistics provides a number of notebooks (laptops) and portable data projectors so that staff are able to hold lectures or give presentations containing a computer demonstration, or slides maintained as computer files. This HOW-TO gives a description of how to set up such a demonstration.

Note: While the advice sheets aim to act as a guide, the inclusion of any products and company names does not imply approval by the NCTE, nor does the exclusion imply the reverse. The NCTE does not accept responsibility for any opinions, advice or recommendations on external web sites linked to the NCTE site.

This Advice Sheet and other relevant information are available at:

www.ncte.ie/ICTAdviceSupport/AdviceSheets