

Printers



Adding a printer to the resources in the computer room had some unexpected results. Students started printing their work, creating posters and making a newsletter, all of which were displayed in class. The effect on some students with poor handwriting skills was marked. The motivation to write, knowing that the end result would be of a high quality, resulted in a notable increase in the confidence and self-esteem of these students.

What is a Printer?

A printer is a device that accepts an image output from a computer and transfers the information to paper. This image can be text and/or graphics and can be produced in either colour or black and white. Printers vary greatly in terms of their size, speed, sophistication and cost, with the most popular types being colour inkjet, monochrome laser and colour laser printers.

Possible Educational Uses

Printers can be used to print out:

- School or class newsletters
- Worksheets and handouts
- Eye-catching charts and graphs
- Signage and flashcards
- Presentations and transparencies
- Photo-like pictures on paper
- Content for project displays
- Student work



Technical Considerations

There are three types of printers suitable for the needs of schools – laser printers, inkjet printers and digital photocopiers.

Laser Printers are electro-photographic devices based on photocopier technology. Even though the initial purchase price of a laser printer is higher than an inkjet printer, they can be more cost effective to run. They combine fast page-per-minute speeds with sharp text and graphics output and a low cost per page. A laser beam is used to produce an image on the drum. The light of the laser alters the electrical charge on the drum at the points of contact. The drum is then rolled through a reservoir of toner which is picked up by the charged portions of the drum. Finally, the toner is transferred to the paper through a combination of heat and pressure. The speed and accuracy of the laser allows even low-cost models to produce many sharply detailed pages per minute. Double sided printing and faster printing is possible on the higher range models. **Laser Printers are the recommended type of printer for schools needs.**

Inkjet Printers are colour printers that produce high quality text or graphics on most types of paper. They have been a very common choice for schools as they are relatively cheap to purchase. However, they can be less cost effective in the longer term than laser printers because of the high cost of replacement cartridges. Most inkjet printers work by storing ink in small cartridges and this ink is then channelled through tiny jets in a movable print head. The ink in the print heads is heated until the pressure forces it on to the paper. This process is referred to as *thermal inkjet printing*. There is also a 'draft mode' function on most inkjet printers which produces lower quality print results. This is ideal for printing draft work and

helps to keep running costs down. Some high-end inkjet printers are capable of photographic quality output. **Because of the costs of replacement cartridges, inkjet printers are generally no longer recommended for schools.**

Digital Photocopiers consist of an integrated photocopier, scanner and laser printer. This design has several advantages such as very high speed printing and the ability to scan page images independently of the process of printing them. Some digital copiers can function as high-speed scanners; such models typically have the ability to send documents via email or make them available on a local area network. Digital copiers can handle large, complex print runs including newsletters and booklets. They offer double sided printing, stapling, collating and folding. Schools should source photocopiers aimed at the small office environment.

Purchasing Considerations

Determining the type(s), speed and number of printers a school requires will depend to a great extent on the individual needs and infrastructure in place in a particular school. There are however, some basic features of printers that should be considered when purchasing.

Resolution

The resolution of a printer refers to the number of dots per inch (dpi) produced on a page, which is usually represented as horizontal and vertical measurement. A printer produces images using an array of dots called a bitmap image. Most printers on the market today have a resolution of 600 X 600 dpi, or higher.

Speed

The speed of a printer is measured by the number of pages per minute (ppm) it produces. Laser printers tend to be substantially faster than inkjet printers, particularly when a single page is being printed repeatedly. It is under these conditions that their ppm rating is calculated. However, output in real terms is slower. It should also be noted that laser printers go into an energy-efficient, stand-by mode when they are not in use and this can result in a slight delay (typically 10-30 seconds) before the printer responds to a new print instruction.

Colour

Printing in colour requires either an inkjet printer or a colour laser printer. An inkjet printer is by far the cheaper option and is capable of producing high quality graphics and text. Inkjet cartridges contain four colours — cyan, magenta, yellow and black. The black ink is generally contained within a separate cartridge so as to facilitate black and white only printing. The other three colours are generally contained in individual reservoirs in one tricolour inkjet cartridge. However, the emptying of one reservoir requires the replacement of the whole cartridge regardless of how much ink is left in the other two reservoirs. To counter this, inkjet printers are now being manufactured with separate, independently replaceable ink cartridges for each colour. Colour laser printers contain four individual toner cartridges – one each for cyan, magenta, yellow and black ink.

Networking

Networking a printer allows all users on a network access to a central printer. This reduces the need to have individual printers in each classroom. Inkjet printers, laser printers and digital photocopiers can be networked but lower cost inkjet and laser printers may not have an Ethernet port built in to the printer. Printers without Ethernet ports can be added to a network but to do so is more difficult and costly than printers with built in Ethernet ports. Some printers have built in wireless capabilities which allow computers to print to them without the need for a direct cable or network connection. Wireless connectivity is useful when used with laptops.

Page Size

Many printers have A4 as a maximum page size but in some instances schools will need A3 output for such subjects as Art and DCG.. Some inkjet and laser printers and almost all digital photocopiers can produce A3 output. An A3 printer will cost approximately 50% more than an A4 printer of similar specification.

Cost

The cost of a colour inkjet printer, including all cables and consumables, can vary from €60 to €2,500. Laser printers are more expensive to purchase, starting at €100(B/W) while colour laser printers start at €250. Digital photocopiers start at €2,000 for monochrome and €3,000 for colour. Digital photocopiers can also be rented. Rental cost is dependant on the type and capacity of the printer.

The consumables associated with printers - toner cartridges, ink cartridges, inkjet paper, photo paper and transparencies - should also be considered when reviewing printer options. According to experts, the initial cost of purchasing a printer represents a mere 15% of the total cost over a lifetime of three years. While consumables for inkjet printers are generally less expensive than those for laser printers, inkjet consumables need to be replaced far more regularly. Broadly speaking, an inkjet cartridge can be expected to print between 100 to 500 pages and a laser toner cartridge can be expected to print between 2,500 to 10,000 pages. However some tweaking of the printer options can reduce the use of ink used especially web pages by ignoring coloured watermarks etc.

Relevant Web Links

How Stuff Works

www.howstuffworks.com/laser-printer.htm

Useful web site which describes the different technologies and how each type works, gives examples, tips etc.

PC Guide

www.pcguides.com/buy/desktopPrinter-c.html

A good source of information on components, performance, cost, and printer types

Wikipedia

http://en.wikipedia.org/wiki/Computer_printer

This web site describes the different types of printer and how each works, and provides examples.

Network Printers: The Essential Buying Guide

<http://www.pcmag.com/article2/0,2817,1618356,00.asp>

Useful guide in purchasing printers

Webopedia

<http://webopedia.com/TERM/p/printer.html>

Defines printers, printer types and associated terms

Getting started with wireless printing

<http://h71036.www7.hp.com/hho/cache/603643-0-0-225-121.html>

Useful introduction on how wireless printing can be set up

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.

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