HARNESSING INFORMATION TECHNOLOGY

Lisa Payne, Coventry University

the ability to identify ways in which IT could be used to enhance sustainability

---

Introduction

Almost all young employees, no matter what their area of work, make wide use of IT. They need to be aware of the role of IT in the goal of improving sustainability. They need to understand that IT developments have caused environmental problems but also that IT can be part of the solution. Creative thinking can help them to understand that the appropriate application of IT can reduce their own environmental impact, both in their personal and professional lives.

Technology is part of the problem

Since at least the 17th century, well before the Industrial Revolution, technology has been seen as providing ways of controlling nature, of harnessing the power of nature for the benefit of humankind. In 1913 the environmental pioneer John Muir tried, unsuccessfully, to prevent the building of the Hetch Hetchy dam in Yosemite National Park (Dresner 2008). Since that time there has been a growing understanding that some technologies can be environmentally damaging and lead to the destruction of ecosystems, particularly 'special' or sensitive ones. This has led to an environmental perspective which risks viewing all technology as being problematic. Whilst it is self-evident that some technologies, in some situations, are environmentally damaging, technology is not always problematic.

IT technologies have developed in ways which have caused many environmental concerns. The most obvious issue is the power usage of the computing equipment itself. Computer users do not help matters if they routinely update hardware and software regardless of their needs. But there are many other concerns ranging from the mind-boggling power consumption of the huge data centres which store much of the world's data, to children in China disassembling obsolete computers to extract the precious metals, images of which are heart-rending and highlight the way that waste from the West pollutes distant environments and exposes children to physical danger.

Recent Improvements

There is a growing awareness in the computing industry that it must reduce its environmental impact. The British Computer Society, for instance, is creating a Certificate in Green IT to assist the computing profession in becoming 'greener' and IBM has launched its Project Big Green. There have been some improvements in recent years. Computers are now more energy-efficient and employ sophisticated power-management systems. Suppliers are aiming to reduce the energy requirements of PCs further: some are aiming for a 50% power reduction by 2010 (from 2007) (Climate Savers Computing Initiative). Ultra-low power notebook computers are now available (Mclellan 2008). Server 'virtualisation' and consolidation technologies allow data to be held much more efficiently. Servers now produce

less heat and can also run at higher temperatures, thus requiring less cooling power. These techniques can reduce the energy usage of data centres by as much as 70% (Ross and Crooks 2008). Paper usage can be reduced with duplex printing; the European WEEE directive requires electrical devices to be disposed of in an appropriate manner; and Apple has committed to remove polyvinyl chloride (PVC) and brominated flame retardants from all its products (Jobs 2008). Whilst these developments are still patchy, the IT industry is starting to address its deleterious impact.

However, it has been estimated by Gartner Research that IT and communication technologies currently generate about 2% of global CO_2 emissions, about the same as the airline industry, and that it is growing at a faster rate (Intellect 2008). They observe that as people replace equipment they tend to buy something bigger or with more functions, which therefore tends to require more power. The Energy Saving Trust (2009) estimates that, if current growth is unchecked, by 2020 IT will form 45% of all UK domestic electricity consumption. This coupled with the increased uptake of IT worldwide, means that the power usage of IT globally may continue to grow rather than diminish.

Today's young people, or at least those who have been brought up in Western Europe, are well aware of some of the most obvious needs of sustainability: the need to reduce power consumption; to develop alternative renewable energy sources; to recycle waste; and to protect fragile environments and species diversity. However they may need some encouragement to see that these principles ought to be adopted in the workplace just as much as in their personal lives, particularly since they may well have had jobs with employers who pay little heed to such imperatives. It is important that learners are encouraged to question such a stance, particularly as they move forward into more professional, responsible roles. The transfer of environmental awareness into a workplace context can lead to a discussion of the 'triple bottom line' of 'people, planet and profit', corporate social responsibility and the ethos of organisations. Some students already have this awareness and express a wish to gain employment with organisations that are environmentally conscious and strive for corporate social responsibility (HEA 2008). However the significance of IT to sustainability is very much more pervasive than minimising power consumption and the 'greening' of computer hardware.

IT as part of the solution

Computing technologies are central to the lives of modern youth. They spend much of their time communicating (MSN, Skype); using social networking sites (MySpace, Facebook, Bebo) or sharing material (YouTube, Flickr, iTunes). They use discussion boards and blogs to share information with others who have similar interests. They do much of their shopping online, maybe using auction sites (ebay). They may well have their own personalised web page from which they can access all their media sources and online facilities (netvibes, Protopage, Google). They use wikipedia as the source of all wisdom (to the despair of many academics). Wireless networks, PDAs and state-of-the-art mobile phones allow them to access such facilities for much of their waking day. These technologies are central to the way that 'Generation Y', those who grew up with the internet, live their lives.

When these young people enter the professional workplace they will probably encounter a much more restricted use of IT. They will see desktop applications and enterprise-wide systems; they'll see email; they'll see the organisation's website and maybe an intranet. Depending on the nature of the business, there may be online facilities provided for clients or

customers. The organisation may use electronic data transfer to deal with its business partners. However organisations are most unlikely to have facilities to allow these young employees to communicate in the way they do in their personal lives. Social networking sites such as LinkedIn and plaxo, aimed at supporting business communications, are emerging. Astute organisations recognise that having a presence on such sites is important for marketing purposes but they also allow their young employees to communicate in ways which, to them, are normal (Marshal 2008).

Learners can be encouraged to identify similar applications of IT which could be adopted by an organisation to enhance its sustainability. They may see that many documents never need to be printed but might be processed and retained electronically. They may see that an online document development system (such as Google docs or wikis) could be used for collaborative work without contributors ever needing to physically meet and without the need for printing or even emailing documents. They may identify opportunities where a blog or forum could support internal discussion. They may spot situations where a 'mashup' can support the organisation's objectives. This is an approach which brings together data from different sources, typically combining map data with locationally-based information, into a webpage, such as used by http://www.housingmaps.com/.

Taking a wider perspective, learners may be able to see other ways to deploy IT to enhance sustainability. The environmental costs of commuting could be reduced by identifying situations in which some staff could work from home or some other remote location using broadband communications and perhaps accessing the organisation's systems remotely. These remote workers could be located anywhere in the world and might effectively support organisational global objectives. Learners may be able to see that meetings with remote partners can sometimes be conducted online, using online meeting or video-conferencing facilities, reducing the amount of travel necessary. Learners ought to be able to identify these and other ways in which the IT tools which they are accustomed to using in their personal lives can be adopted in business practice, improving sustainability. Some of these solutions would need to be implemented by technical experts, who would also need to deal with any related security issues, but today's employees ought to be encouraged to look for such opportunities.

Summary

In summary, this chapter has discussed how learners might be encouraged to identify ways in which IT usage can be made more sustainable. Beyond that it has discussed how the introduction of new IT facilities and systems might enhance sustainability overall, particularly by drawing on students' experience of IT systems in their personal lives. Learners, even quite early in their careers, may be in a position to encourage the introduction of such beneficial systems. Early-career professionals are often involved in business decisions and they need to be encouraged to consider the sustainability implications of these decisions in the same way that they are expected to consider ethical and professional implications.

Activity

For this activity, learners are firstly provided with a Case Study of an organisation of the type which they may see as a potential future employer. The following is an example case study which has been used with computing students (Payne 2009).

Case Study

> The software house WebIt creates custom websites. Most of their clients are small businesses, mostly local, in Coventry, but are spread over the whole of the West Midlands, with a few elsewhere in the country. WebIt operates from an office suite, in a building which they own, which is a converted Victorian office block. It was converted to modern office usage about 20 years ago, having been vacant for a period before that. It is situated close to the centre of Coventry.
>
> WebIt is small, employing 10 technical staff and 2 receptionists, who also do the clerical work. Most staff live within 6 miles of the office though 2 senior consultants drive in daily from Wolverhampton, 35 miles away. WebIt is run by Mr Ima Nugget. It was set up 6 years ago and is now quite successful, always having enough business to keep all staff busy. A significant aspect of clerical work is dealing with appointments for staff to visit clients, or clients to visit them, and associated travel expenses.
>
> The services WebIt offers, as well as designing and developing web sites, includes providing web server space for some clients; setting up and maintaining local servers for other clients and more generic IT hardware and network advice and provision. Providing server space for others was where the company started: they now have a small room full of servers. They don't usually get involved with client's other software issues.
>
> Mr Nugget has employed your team, as consultants, to advise him on sustainability concerns. He has not given such issues any consideration previously.

Tasks

The following tasks are related directly to the case study.

> a) In groups, identify six tips which you would recommend to the organisation as to how they could use IT, or change their current IT usage, to improve their sustainability. You should consider issues which cover a range of sustainability aspects such as environmental, economic, societal and spatial.
>
> b) For each tip you should then identify web resources which support the tip: resources that provide details, guidance or data on that topic. These resources must be reliable and authoritative and, as far as possible, unbiased. You need to clarify the nature of the authority: which organisation created the resource and why you believe this to be a reliable source of information. You are not asked to try to judge whether the information itself is accurate.

In the spirit of the assignment, learners could be asked to present their work as a wiki, using one of the freely available wiki sites.

Vocational Variant

If learners are already in professionally-relevant employment then they could be asked to identify say six aspects of their employer's operation which are not currently very

sustainable. Learners would describe each, highlighting the sustainability concern. These concerns would then form the basis for identifying possible uses of, or changes to, IT which would enhance sustainability.

BCS (2009) *IT policies and your green credentials.* British Computer Society Video debate. www.bcs.org/server.php?show=ConWebDoc.23601

Climate Savers Computing Initiative (2009) www.climatesaverscomputing.org

Computing (N.D.) *Green Computing.* www.computing.co.uk/greencomputing

Dresner, Simon (2008) *The Principles of Sustainability.* London: Earthscan 2nd ed

Energy Saving Trust (2009) *Energy Saving Products: Computers and Peripherals.* www.energysavingtrust.org.uk/Energy-saving-products/Computers-and-peripherals

HEA (2008) *'StudentForce for Sustainability' project*. York: Higher Education Academy. www.heacademy.ac.uk/projects/detail/esd_employable_graduates

Intellect (2008) *High Tech: Low Carbon - The role of technology in tackling climate change.* Intellect Association Report, Feb 2008. www.intellectuk.org/hightechlowcarbon

Jobs, Steve (2008) *Apple 2008 Environmental Update.* Apple Inc. www.apple.com/environment/update/

Marshal (2008) *Social Networking: The pros, the cons and the solution.* Marshal Ltd. July 2008. www.zdnet.co.uk/i/s/ads/whitepaper/Marshal/WhitePaper_SocialNetworking.pdf

Martin, Stephen (2008) 'Sustainable Development, Systems Thinking and Professional Practice.' *Journal of Education for Sustainable Development* 2(1) 31-40. www.heacademy.ac.uk/assets/York/documents/ourwork/tla/sustainability/sdstpp_martin.pdf

Mclellan, Charles (2008) *Low-power Computing: a tech guide. Green IT Toolkit*. ZDNet.co.uk. http://reviews.zdnet.co.uk/hardware/0,1000000323,39363065-4,00.htm

Payne, Lisa (2009) 'Using a Wiki to Support Sustainability Literacy.' *Italics*. www.ics.heacademy.ac.uk/italics

Ross, Margaret and Crooks, Bob (2008) 'Overview of Green ICT.' "*Green IT: Challenge or Opportunity*" BCS/HEA workshop, 14 Nov 2008, London. www.bcs.org/upload/ppt/greenit-ross-crooks.ppt