**May 2008**

**TechNews** is a technology, news and analysis service aimed at those in the education sector keen to stay informed about technology developments, trends and issues.

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## Networking and wireless

### Analysis: Context awareness

Context-aware computing introduces a link between the behaviour of a device/program and information it has collected about the current situation. This may be information about the user, location, proximity of other devices, environmental data, an understanding of the task being carried out by the user or even their emotional state. The level of context data can vary considerably as can the sophistication of the response. On a simple level a device may use sensors to adjust the display for landscape or portrait depending on its orientation (eg iPhone). More complex examples may involve using multiple elements of context- however as complexity increases more issues arise around the systems ability to interpret the needs and behaviours of the user. Ultimately, it is about systems that can adjust to the context to provide the right information at the right time in the right format.

So, the aim of this field of development is to create devices (software or hardware) that can better serve users by understanding and predicting need. The more sophisticated uses of context awareness have links to the ubiquitous computing vision as conceived by Mark Weiser. To deliver the ubiquitous computing vision computing would need to change – both devices and the networks that link them. Devices would need to become ubiquitous and embedded in objects and the environment; open standards for sharing would be key along with universal networks to enable links; software would have to be smarter with intelligent agents able to predict our needs and build some understanding of multiple sources of contextual information. However, more basic examples of context awareness are already being used and continue to develop, particularly in the area of mobile devices and location based services.

The most common contextual understanding in the current generation of devices is location-awareness. This may be giving absolute location as with GPS, or relative location as with local area technology such as Wi-Fi, or even shorter range technologies such as Bluetooth or bar-code/RFID reading. Other types of sensor, that measure movement, light, pressure, temperature or moisture have been around for some time, though they are more commonly found as part of specialist solutions rather than the emerging general-purpose devices. Micro-Electro-Mechanical Systems (MEMS) are increasingly used in a range of devices. These are mechanical parts incorporated on chips. An example of this is the accelerometer used in the Nintendo Wii remote to detect movement. Digital cameras use similar approaches to tell if a picture has been taken as landscape or portrait.

Increasingly GPS chipsets are being included in mobile phones. GPS data can be linked with software to deliver location-related information such as ‘nearest x’ or ‘best route to y’. The next generation of services relates the user to other people. For example the Optus Friend FindA  offers mobile phone users the ability to locate their friends on a map. The MIT iFind service allows students and staff to let other people see their location on campus. Local search is another area likely to become more prominent.
http://mobile.optuszoo.com.au/cocoon/aggregate/bf.genasys.com/optusbuddy/optusmobile/landing.html

Location based information has been used in a number of educational projects. For example some museums automatically deliver information to a user’s mobile device, based on proximity to an exhibit. Tools such s Createascape [http://createascpe/org.uk] or CAERUS allow teachers to create mediascapes by tagging content to real world locations that can then be explored by learners. These location-aware computing and augmented reality

applications are covered in more detail in TechNews March 2007.

One technology being developed is affordable augmented reality systems that overlay digital information onto a view of the real world (on a cameraphone display for example). The Mobile Augmented Reality Applications (MARA) project from Nokia uses a range of different sensors in a mobile phone, including GPS, accelerometers to measure unit aspect, a compass and a phone camera to bring together a range of different context sensitive data over the video feed of the real world. This data is processed for use in a range of applications, such as friend finders, visual navigation on the phone screen and embedded URLs related to real-world places. This is currently a research project but shows how mobile devices may support context-aware augmented reality applications in the future. A current example of this is Geovector's point and find system already trialled in Japan. This uses a combination of actual location and bearing to link users with data. For example pointing a phone at a cinema would give the website with film times and related services such as the ability to buy tickets.
http://www.geovector.com/
http://research.nokia.com/research/projects/mara/index.html

Mobile phones can be limited in processing power and screen size. Devices such as the UMPC address this through more powerful processors and larger screens, support for 'generic' accessories through industry standard connectivity options such as USB; and common operating systems such as Microsoft Windows XP and Linux. The market for these devices is growing rather than established, but it is likely that small, powerful, portable multimedia devices will effectively support a new range of context-aware applications. Portable computing such as this will also benefit from new wide-area high capacity wireless links such as WiMAX and 3.5G/4G. This technology will mean that large amounts of contextually appropriate multimedia information can be downloaded on-demand to users.

Looking further forward, Intel is involved in research around Dynamic Composable Computing (DCC) and Carry Small, Live Large (CSLL) approaches. These approaches are based on devices detecting and interacting with each other. So rather than being based only on location, they are based on opportunity. For example a portable music player could detect the presence of a PC-based room media system. The portable device could then act as a remote control for the room-system, or use the full-size speakers instead of headphones for output. The terminology used by Intel is 'aggregator' for data-collection routines and 'analyzer' for decision making.
http://techresearch.intel.com/articles/Mobility/1565.htm

This modular approach will require a range of miniature devices, with associated issues of battery life and communications. Associated developments in software defined radio (where one chip can be programmed to meet many requirements) will be essential for flexibility and compatibility.

As well as looking to the outside context, computing can also look inward to the user. The military has for some time been interested in wearable computing that is aware of a soldier's physical state. For example elevated temperature and heart-rate for extended periods is useful information for a commander. Bio-sensors of this kind also have traditional medical origins and applications. Detecting emotional information is theoretically possible though in the past has been quite crude, but research is rapidly increasing effectiveness. One question then is how valuable is this information and can behaviours be programmed to make proper use of it. For example, measuring skin conductivity and tracking a user's eye movement whilst looking at a screen could help determine the learner's state and receptiveness to

learning at any given time. Content could then be tailored to fit.
http://images.1-to-x.com/acse/artMySelf02.pdf
Software agents, programmes that look for opportunities and tasks to make a user's life easier by providing just in time information or carrying out tasks in the background are also seen as key to integrated context aware systems.

'Smart' classrooms have also being researched (eg MIT's Project Oxygen). Projects have typically involved embedding sensors into classrooms that can respond to users. At a simple level this may mean dimming the lights when the projector is being used or automatically capturing lessons (audio/video/digital content). More complex examples would include systems that can recognise individuals and devices and then respond accordingly.

For all the opportunities this kind of technology may present there are risks. Any kind of tracking system, for example, has privacy implications. Some may see it as appropriate, for parents to have knowledge of the location of a child, but others may see this as an invasion of privacy. There is also a massive challenge in delivering more complex context-aware outcomes effectively. The human brain is incredibly complex and the task of predicting and replicating complicated decision making tasks is likely to take some time to achieve, if indeed it ever becomes possible and desirable. However, the simpler forms of context and location awareness are already beginning to appear and offer opportunities for education.

More information on this topic is contained in Becta's 'Emerging Technologies for Education, Volume 2, 2007 - Ubiquitous computing.'
http://partners.becta.org.uk/upload-dir/downloads/page_documents/research/emerging_technologies07_chapter6.pdf

## Networking and wireless news

### Becta emerging technologies for learning volume 3 published

Becta has published the latest in its series of reports on 'Emerging technologies for learning'. This report aims to help readers consider how emerging technologies may impact on education in the medium term. The publications are not intended to be a comprehensive review of educational technologies, but offer some highlights across the broad spectrum of developments and trends. It should open readers up to some of the possibilities that are developing and the potential for technology to transform our ways of working, learning and interacting over the next three to five years.
This third volume includes articles on the implications for education of the 'Google generation'; information clouds; location-based and context-aware education; emerging trends in serious games and virtual worlds; developments in search technologies; and interactive displays and next generation interfaces.
http://partners.becta.org.uk/index.php?section=rh&rid=13768

### New UK digital inclusion strategy

A new cabinet committee has been set up by the UK Government to look at the needs of the 17 million UK citizens who do not have online access. This cross-government committee has the mission statement 'To co-ordinate policies and a coherent strategy that all citizens, especially the disadvantaged, can benefit from new technologies' and expects to have a strategy in place later this summer. This initiative complements aims of other departments, such as the Department for Children, Schools and Families, who have set up a Task Force to look at the

potential of giving every household with a child aged between five and nineteen the opportunity for internet/computer access..
http://news.bbc.co.uk/1/hi/technology/7373970.stm

**Next generation networks update**

Telecom regulator Ofcom has announced its latest consultation exercise on next generation telecommunications infrastructure. This consultation is focussed primarily on new-build opportunities. It is widely accepted that there needs to be a step change towards increased penetration of fibre as an alternative to copper, especially in the last mile, but there is no clear strategy about taking this forward on a wide scale. The consultation notes that existing operators such as Virgin Media and BT are improving their offerings and new entrants, such as H2O are innovating with fibre through sewers.
http://www.ofcom.org.uk/consult/condocs/newbuild/

The chief executive of Ofcom, Ed Richards, used a speech in April to set out some of the challenges he sees in making these changes in a competitive environment. He explored the role of regulators in guiding and stimulating the market and touched on the importance of new services such as IPTV in increasing demand which in turn justifies network capacity improvements.
http://www.ofcom.org.uk/media/speeches/2008/04/ietspeech

The next stage in BT's upgrade of it infrastructure to an all IP based network, known as 21CN or the 21st Century Network, has seen the release of ADSL2+ services to wholesale customers. This could allow speeds of 24Mbps to customers. Other operators have been offering these speeds for some time.
Some analysts have warned it should not distract from the more fundamental issue of deploying high speed fibre services.
http://www.btplc.com/News/Articles/ShowArticle.cfm?ArticleID=0262452b-8039-4db0-a5e7-464075149d94

The World Economic Forum has published its latest annual Global Information Technology Report which includes information on network readiness for next generation communications technologies. In this latest issue the UK has now dropped to twelfth place. Denmark and Sweden top the league table.
http://www.weforum.org/en/initiatives/gcp/Global%20Information%20Technology%20Report/index.htm

**Ultra Wideband concerns**

Texas Instruments has withdrawn from the WiMedia Alliance. Texas was a key member of this industry group developing high speed, short range Ultra wideband (UWB) wireless technology. The withdrawal of Texas Instruments is considered to be a significant setback to the technology. Initial implementations of Wireless USB (based on UWB) have been widely seen to be disappointing, not achieving speeds near the 480Mbps claimed possible for the technology.

The Bluetooth Special Interest Group, which has been planning a UWB version of Bluetooth, has recently announced it is also looking at using 802.11n Wi-Fi links to

provide higher data rates for Bluetooth connections when needed.
http://www.reghardware.co.uk/2008/02/10/bluetooth_sig_confirms_wifi_plan/
Ultra-wideband was covered in more depth in TechNews April 2007.
http://wireless.itworld.com/4245/ultra-wideband-in-doubt-after-texas-instruments-pulls-out-080509/page_1.html

**Wireless broadband update**

WiMAX, the emerging wireless broadband technology, comes in two varieties: fixed and mobile. Fixed WiMAX was agreed as IEEE 802.16-2004 and Mobile WiMAX as IEEE 802.16e-2005. It is expected that initially the real-world speeds of WiMAX will be around 2-10Mbps at a range of up to10km. A faster version of WiMAX, 802.16m, is expected in 2009.

WiMAX is being considered by researchers at Intel as part of its Rural Connectivity Platform alongside a modified version of Wi-Fi. This is hoped to provide long range, affordable connectivity for developing countries at a low cost. The outputs of this project will support data transfer in quite hostile environments, often away from infrastructure such as mains power. Network access is considered a key to economic stimulation as well as a better quality of life through access to telemedicine and similar support services. Mesh approaches, using a number of peer-to-peer base-stations were widely touted as appropriate for 802.11 Wi-Fi services, but the short range meant few projects reached critical mass. The longer range of WiMAX makes it potentially much more suitable.
http://www.dailywireless.org/2008/03/07/intels-rural-connectivity-platform/

Nokia, Sony Ericsson, NEC and Alcatel-Lucent have come together to agree a licensing framework for LTE technologies. This is hoped to give the technology a boost as the alternatives continue to compete to be the basis of the worldwide 4G standard. The CEO of Vodafone has suggested that the best future for LTE and WiMAX is to merge.
http://www.reuters.com/article/technologyNews/idUSL1414726520080414
http://www.fiercewireless.com/story/vodafone-ceo-wimax-has-a-home-in-lte/2008-02-12?utm_medium=rss&utm_source=rss

**Wi-Fi update**

The market for high quality wireless LAN infrastructure for demanding users such as offices and schools continues to develop with vendors announcing new products based on the 802.11n standard. Management features and maximising throughput are two areas of interest. Vendor Meru has announced a new four-radio unit for its ‘channel blanket’ approach to Wi-Fi delivery that can potentially offer 1.2Gbps throughput. Competitor Aerohive is pushing a peer-based solution that works without a central controller. Xirrus are promoting high-density Wi-Fi solutions that bring up to 16 radios together in a single unit to save power and simplify management.
Emerging WLAN architectures were covered in more depth in TechNews September 2007.
http://www.techworld.com/networking/news/index.cfm?newsid=12032&email
http://www.techworld.com/networking/news/index.cfm?newsid=12032&email
http://www.xirrus.com/cgi-bin/press_releases.cgi?id=205&template=1

The growth of phones which support Wi-Fi has encouraged TapRoot Systems to produce its WalkingHotSpot software. This will allow a smartphone to behave as a general purpose internet wireless access point. Laptops, MP3 players and other devices will then be able to share the connection and gain network access.
http://www.walkinghotspot.com/

**Satellite communication news**

Researches at NASA's Ames Research Center have announced a new partnership to develop a next generation satellite communication technology. The proposed approach is to use 'nanosats' - satellites that are smaller and therefore cheaper than current units. This would enable a large number of devices to be more easily and efficiently positioned in a low earth orbit. A higher number of units could provide more bandwidth and therefore a wider range of commercial and communication opportunities. If this project succeeds it may prove a foundation for fifth generation or 5G mobile services.
http://www.nasa.gov/centers/ames/news/releases/2008/08_35AR.html

**Satellite positioning update**

The European Parliament has, as expected, approved the next stage of support for the Galileo satellite navigation system. This is a joint European project to rival the established US GPS system and is expected to be more accurate through the use of the latest technology. Currently the system has only a small number of demonstrator satellites in orbit, but this political backing gives financial stability and the ability to continue the roll-out. Galileo and GPS have agreements in place to ensure the two systems can coexist.
http://www.publictechnology.net/modules.php?op=modload&name=News&file=article&sid=15401

Researchers from ABI Research have predicted increased proliferation of low-cost GPS components in a range of devices, with revenue expected to grow from around $515m to $13.3bn in the next five years. Many mobile phones now come equipped with these low-cost integrated chipsets, and a growth in location-aware applications means there is increased demand in a range of other devices such as digital cameras. However, the prices of personal navigation devices are continuing to fall and analysts say that this core market may be saturated. Location based services in education was covered in TechNews March 2007.
http://www.vnunet.com/vnunet/news/2215535/global-navigation-systems-find

**EU calls for move to IPv6**

The European Commission has called for member states to move 25% of EU industry, public authorities and households to use IPv6 by 2010. The number of IP addresses available under the current IPv4 system is fast running out. IPv6 offers effectively limitless addresses as well as other advantages such as improved security. The success of technologies such as network address translation (NAT) that mitigate the lack of IPv4 addresses, has meant that the expense and issues of migration to IPv6 have been widely put off. Most interest has come from military or research institutions. However, the EU sees an early move to IPv6 as saving later

costs and offering a competitive advantage, particularly as more devices, nodes, sensors and tags become connected and addressable.
http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/803&format=HTML&aged=0&language=EN&guiLanguage=en

### Rural broadband penetration overtakes urban

A recent report from Ofcom, looking at the variations between different parts of the UK, has found that the uptake of broadband in rural areas (59%) has overtaken that of urban areas (56%) for the first time. The report also found large regional variations in the uptake of services such as broadband, 3G phones, VoIP, and watching video online.
http://www.ofcom.org.uk/media/news/2008/05/nr_20080522
New research published by Frost & Sullivan paints a positive picture of the regulated broadband markets in Europe. The 'Broadband Market in Europe' research concludes that increasing deregulation has led to the intended growth in range of services available to businesses and consumers as well as competitive pricing. Analysts concluded that while Western European markets, such as the UK, France and Germany, are reaching some kind of saturation, the developing markets in central and eastern Europe are experiencing rapid growth. The challenge for existing markets, such as the UK, is the development of new services that will justify network upgrades and increase revenues. It is these new services that could benefit education users.
http://www.vnunet.com/vnunet/news/2215353/european-broadband-growth-strong

## Multimedia

### Analysis: Handheld games consoles in education

Paralleling the development of PDAs, handheld games consoles are becoming far more capable computers. These portable, individual consoles are available in many homes and are increasingly capable of delivering rich e-learning. The inclusion of web browsers means it is now relatively easy to get custom made content onto portable games consoles.

### The consoles

There are three major systems on the market today, two use dedicated hardware, the Sony play station portable (PSP) and the Nintendo (DS) the other, Nokia N-Gage, uses software that runs on certain Nokia mobile phones. In addition PDAs and smartphones are also capable of running games software.

### Nintendo DS

The Nintendo DS launched in 2004 followed the long line of Nintendo Gameboy handheld games. A slimmer version, the DS Lite, was introduced in 2006. The DS differed considerably from previous systems with the inclusion of a touch screen that could be used to control the games. The DS has two three inch Liquid Crystal Display (LCD) screens: a standard display screen on the top half of the console and a second resistive touch screen in the lower half. Another innovation brought in by the DS was the use of a microphone to allow for voice commands to be incorporated into games. Finally it added wireless networking using 802.11 Wi-Fi . This allows for

DS consoles to communicate to other DS consoles in the local area using peer to peer networking, or access the internet via an 802.11 compatible wireless router. In the UK Nintendo did a deal with BT to offer free access to their BT Openzone wireless network for DS owners.

There are only two programmes built into the console itself, a clock and Pictochat. Pictochat is instant messaging software that allows the user to communicate with other DS users using text or pictures.

The console uses a proprietary solid state read only memory cartridge (ROM) to store game and application information. The card is slotted into one of two cartridge slots, with one slot being used for legacy Nintendo Gameboy advance games. Each ROM holds a separate programme or suite of programmes and needs to be removed and replaced so two applications cannot be used at once. The cards support up to two gigabytes of storage and have an on board flash memory chip to store state information such as saved games. This means that the some user information is transferable between devices using the on board flash.

As with all consoles there is a development community whereby amateur programmers create software that can be run on the console. This has produced a version of Linux that will run on the DS as well as a personal organiser. These applications use developer tools which include a DS cartridge into which a Secure Digital (SD) memory card can be slotted to test work in progress.

**Sony Play Station Personal (PSP)**

The PSP was Sony's first hand held console and is a development of the Play Station 2 console. The PSP was intended to be a multimedia device capable or running games, as well as playing MP3 music and MPEG video. Whereas the DS has its own memory format, the PSP includes a Sony Memory Stick slot, which allows photographs and music to be moved from a camera or PC to the PSP relatively easily. The PSP includes a larger four inch LCD screen, but the control is through a traditional 'D-Pad' or crosshair joystick control. The PSP also features 802.11 wireless networking, a USB port and infra red data port (IrDA).

The PSP uses an optical disk to store games rather than a ROM cartridge, the Universal Media Disk (UMD) format stores up to 1.8 Gigabytes of data and can be used for games or movies. As with the DS, there is little local storage and to change applications requires the user to swap disks. Unlike the DS however, the PSP does have a suite of local applications including a built in web browser, MP3, video and photographic display. Sony has also released a number of add-ons for the PSP including a digital camera, voice recorder, and GPS and mapping software, making it a highly capable device for location based computing and mobile learning. The PSP also features a 'parental control' feature that allows a user to set the level of content that can be viewed on the device with a rating scheme that runs from 1 to 11, with 11 being the most open and 1 being the most restrictive.

Versions of Linux and the DOS emulator DOSBOX have been made available and interestingly a system that allows users to search for and view YouTube videos has been developed.

**Nokia N-Gage**
Nokia attempted to break into the handheld console market in 2003 with a combined mobile phone and games console. Learning from their mistakes with the hardware N-Gage, Nokia has now released an N-Gage software platform for use with specific Nokia mobile phones. N-Gage 2.0 is a downloadable games software platform for its 'N' series mobile phones. The functionality of the device is largely dependant on the functionality of the phone, however the N-Gage software is capable of running networked games using 802.11 internet connectivity, WiMAX or 3G mobile phone networks. N-Gage is part of Nokia's wider OVI initiative designed to create an ecosystem of software, content and services for mobile phones.

The N-Series all come with built in MP3, video, and photo playback and include internet connectivity and web browsers. In addition those at the higher end of the range such as the N95 are fully functional PDAs, include digital cameras and have built in GPS.

**Software**
The success of the Dr Kawashima's brain training software on the Nintendo DS has lead to a large number of learning and self improvement focused games being developed for all platforms. Indeed a brain training like game is available for the DS, the PSP, N-Gage, and Palm PDA formats.

**Web Browsers**
All three major platforms have the possibility of supporting a web browser. Version 2.0 of the PSP operating system and the N series phone platform for N-gage have the web browsers built in.

The DS has no built in browser and needs a ROM cartridge containing a copy of the Opera web browser. Both the PSP and the N-gage use bespoke web browsers, which with the PSP can include tabbed browsing and some Flash support. The Nokia browser includes support for Flash lite and JavaScript, whilst the DS Opera browser supports JavaScript but not Flash.

The inclusion of a web browser potentially allows students to navigate a virtual learning environment or other learning resource from their games console, and some VLE developers such as redhalo have built specific mobile learning versions of the their software. Simply including a browser on a device does not mean it will behave properly and be usable with a range of sites, including VLEs, so testing is important before large scale deployment.

The N-Gage and the PSP also allow students to download certain games, photos music and video files. Both the N-gage and the PSP feature support for RSS allowing the user to be alerted to updates in web-sites including the uploading of new photographs. There are uses for location based computing allowing students to

record, geographically tag and share content using their handheld consoles. Futurelab has done considerable work on location based and mobile learning including their mobi missions project.
http://www.futurelab.org.uk/resources/documents/project_reports/MobiMissions_report.pdf
http://www.futurelab.org.uk/resources
http://www.redhalo.com/devices.html
http://www.c-sap.bham.ac.uk/resources/project_reports/findings/ShowFinding.asp?id=140

The popularity of the Nintendo DS with a wider family audience than traditional gaming has lead to a number of teach-yourself style games. As well as basic literacy and numeracy, and spatial awareness challenges such as the different brain training and brain gym games, a number of language tools have been released. These include traditional vocabulary games such as scrabble and applications with a number of games focused on improving vocabulary in English and the main European languages. Ubisoft's coach series includes vocabulary, grammar and pronunciation tests, using the DS microphone to record and evaluate the users pronunciation. A similar product supporting six languages was released for the PSP, the Talkman software included a microphone for use with the PSP's USB slot.
http://www.talkmanpsp.com/
http://www.ubi.com/UK/Games/Search.aspx?plTag=ds
Although the N-Gage does not have any education focused games yet, the Symbian operating system on which it is based does allow users to download language reference software including translation dictionaries and some audio phrase books.

**Numeracy and literacy**
The popular brain training and brain gym style games are being incorporated into learning. Learning Teaching Scotland's research project has taken lessons from Japanese schools and trialled the use of a learning 'warm up' with primary school students playing problem solving games focused on literacy and numeracy. The study discovered that after ten weeks of use students were able to complete numeracy tests faster and achieve better results. They also believe that the use of the DS has improved behaviour and responsiveness within lessons.
http://www.ltscotland.org.uk/news/2008/pressreleases/march/news_tcm4480706.asp

Sony has also launched a number of pilots using the PSP within the classroom. These have focused on a number of areas including English, arts and modern foreign languages. Holyhead school in Birmingham is using the built in features of the PSP to drive language learning in the classroom. Teachers upload podcasts, photographs, audio and video clips in French, which the students then download and interact with. They found that the ability for students to control the same video individually allowed them to better interpret the content than with a single whole class projector.

Interestingly a new feature developed to link the PSP and PlayStation 3 (PS3) called remote play allows the PSP user to access files stored on the hard drive of a PS3. The PSP can call up and play, and control video, audio and photographic files, but

cannot access the disc drive, so cannot play Blu-ray discs or games. This has potential for on demand video learning within a workshop environment, with the PS3 acting as a server for the multimedia content.
http://www.connectededucation.co.uk/Homepage?Plugin=Test&TTU=0&thelayout=3&docname=PSPinEducation
http://www.handheldlearning.co.uk/

### Conclusions

All of the handheld gaming systems are interesting and offer new potential ways for the learner to interact with learning, though with reservations. These devices do not offer the flexibility, power, range of software, and content creation features of PCs/notebooks or even PDAs.

Each of these devices is aimed at a different market, with different functionality. The emphasis of the DS, like the Nintendo Wii console, is on usability and innovative user interface. The market for this product is perhaps aimed at users who are less focussed on graphics or sound quality. The DS is useful for engaging learners and providing literacy and numeracy support. The PSP and N-Gage (with phone) are more multi-purpose tools, with expansion options, though this is balanced with additional cost. The N-Gage is a relative newcomer with version 2.0 being released in March 2008 and it will take time for this new platform to become established and the potential uses in education to be understood.

## Multimedia news

### New satellite television service

The BBC and ITV have launched a joint satellite service to complement the Freeview offering. ‘Freesat’ offers a range of free-to-air channels for the one-off cost of a set-top box and satellite dish. As well as offering being able to offer a large range of digital channels to most of the UK, the new service can also offer free High definition (HD) channels such as BBC HD. The service includes all the BBC digital TV and radio channels and a range of other channels including Teachers TV. It uses the same satellite as Sky and will be of particular interest in areas with poor or no Freeview reception, or for those looking to receive HD channels without subscription. This collaboration follows BBC, ITV and Channel 4 announcing the joint development of Project Kangaroo, which is a shared online media player to offer viewers on-demand content – including the chance of catching up on recent shows or accessing archive content. Project Kangaroo is expected to launch in 2008 under a new name. Initially the service will be available for the web but may also be integrated in digital TV services.
http://www.freesat.co.uk/
Satellite broadcaster Sky offers a similar subscription free package called ‘Freesat from Sky’, but currently only subscribers can receive HD channels.
http://www.freesatfromsky.co.uk/

### Research highlights benefits of virtual worlds

New research for the BBC carried out by the University of Westminster has concluded that virtual worlds can offer a space for children to rehearse for real life. The research was focussed particularly on the BBC's Adventure Rock virtual world, aimed at 6-12 year olds. This world is not truly shared, like Second Life and online games such as World of Warcraft, but children are encouraged to share their thoughts and experiences through online discussion outside of the game.
http://news.bbc.co.uk/1/hi/technology/7415442.stm
http://www.virtualworldsnews.com/

### Microsoft multimedia touch interfaces

The next version of Windows, which could be released as early as 2009, is expected to support multi-touch interfaces.
http://www.techworld.com/opsys/news/index.cfm?newsid=101604
Microsoft's current touch technology is also seeing adoption. Telecommunications giant AT&T has announced it will be using Microsoft's Surface technology in a number of its stores. Surface is based on a computer built into a table with a touch display. The idea is that software can be manipulated by touching, dragging and pressing on the table which replaces both the mouse and the monitor. This is perhaps more analogous to traditional ways of working with papers on a horizontal surface rather than the vertical plane of a PC screen.

AT&T plan to use Surface to allow customers to learn about the different functions of devices and the work of the company. A key feature of Surface is peripheral device recognition where, for example, a digital camera placed on the surface would be detected and the images automatically downloaded and displayed around it.
http://www.att.com/gen/press-room?pid=2604

Microsoft researchers have demonstrated an alternative way of allowing user input and manipulation on a flat surface. The concept is to use infrared cameras and low power lasers to create a grid over a display. These detectors then pick up hands or fingers that break the grid and treat this as mouse activity. Such an approach could be used on a range of displays such as LCD screens and projection screens.
http://news.cnet.com/8301-10784_3-9950674-7.html?part=rss&subj=news&tag=2547-1_3-0-5
See Emerging technologies for learning volume 3 for more information on touch displays:
http://partners.becta.org.uk/index.php?section=rh&catcode=_re_rp_02&rid=13768

### E-paper news

Electronic paper promises a revolution in the way books and newspapers are produced in the future but to date few mass-market products have captured the wider public's imagination. The latest development from Epson is larger units, up to A4 size. Previously the technology was only delivering 7.1" displays. Electronic paper is only found in a small number of commercial products currently. Consumer products are focussed on electronic book readers, such as the Sony Reader and Amazon's kindle. The technology behind these products is based on using the application of electric current to rotate particles to show white or black and hence

constructing a paper-like finish. Electronic paper can have resolution approaching print; is reflective, so requires no backlight and can be read in bright sunshine; and is low power. Research is looking at increasing the speed and resolution of e-paper as well as adding colour. E-paper prototypes have also being put on flexible substrates allowing rollable displays.
http://www.reghardware.co.uk/2008/05/22/epson_epaper/

Epson have also announced a new prototype controller chip developed with E-Ink Corporation and Prime View International. This chip enables new displays to be refreshed up to 50 times per second which potentially allows for real time touch-screen applications including note-taking, documentation and drawing. In addition to this the user navigation through multiple pages in a virtual document may be improved.
http://www.epson.co.jp/e/newsroom/2008/news_20080416.htm

**Display news**

The highest resolution of the current generation of HDTV displays is 1920x1080 pixels. Samsung have shown a demonstration unit which offers 3840x2160 – double the resolution – in an 82" display. Some displays at this resolution already exist for specific industrial applications but this type of product is aimed at consumers and the mass market. This size of display would be suitable for a classroom as much as a corporate headquarters, but is likely to attract a significant price premium – at least initially. http://www.hdtvinfo.eu/news/hdtv-articles/82-inch-ultra-hd-lcd-tv-from-samsung.html

There are two competing approaches to deliver next-generation high resolution digital connections between computers, televisions, home cinema equipment and high resolution displays. These are HDMI and DisplayPort. HDMI is currently more popular with consumer electronics manufacturers and DisplayPort has the led with computer equipment. HDMI is compatible with the existing DVI connector, but DisplayPort is not. Despite technical differences the two are competing ultimately in the same market as computers and home equipment merges. Analysts at InStat estimate DisplayPort will ship 600m products in 2012, while HDMI is expected to reach 1.2bn products by 2010.
http://www.reghardware.co.uk/2008/05/15/displayport_vs_dvi_vs_hdmi/

LG have announced that their partnership with Philips has led to early prototypes of a double-sided LCD display. These proposed displays, that can display independent images on different sides of a screen, are likely to be first found in mobile phones but then scaled up. The 15-inch prototype reportedly has a resolution of 2048 x 1536.
http://www.lgphilips-lcd.com/homeContain/jsp/eng/inv/inv101_j_e.jsp?BOARD_IDX=1395&languageSec=E

**Mobile TV**

Following the official backing in the European Union for the DVB-H (Digital Video Broadcast-Handheld) standard, mobile phone handset manufacturers are looking to the US as the next market. At the start of 2008 Samsung were promoting A-VSB

(Advanced-Vestigial Sideband) while MPH (Mobile Pedestrian Handheld), was supported by LG Electronics. Both companies have announced that they will collaborate on a single solution for handsets but further details are yet to be announced.
http://www.theregister.co.uk/2008/05/15/omvc_mobile_tv_standard/
http://news.yahoo.com/s/zd/20080514/tc_zd/227506

Mobile TV has yet to achieve consumer interest to the levels expected by network providers or handset manufacturers. However, the US is a huge market and if there is sufficient interest here then the handheld multimedia revolution might yet happen.
http://wireless.itworld.com/4269/mobile-tv-push-080414/page_1.html

Although the EU has officially backed DVB-H, US technology company Qualcomm has bought the licenses to a large amount of spectrum in the UK that will allow it to use its own MediaFLO technology to deliver mobile video services.
http://www.qualcomm.com/mediaflo

**Adobe update**

Adobe has launched a Media Player application. The Adobe Media Player is a cross-platform, stand-alone application that can be used to play a range of media files – both offline and online. Rather than compete with general purpose media players such as Microsoft's Windows Media Player and Apple's iTunes, AMP only supports FLV (Flash) or MPEG-4 video content. Adobe has secured a range of content to be delivered through the Adobe Media Player including educational content from PBS, a US public service broadcaster.
http://www.adobe.com/products/mediaplayer/

Adobe Flash has reached the beta stage for version 10. This latest version includes advanced text controls and 3D effects. Version 9, first released in 2006 has been updated a number of times. Flash is used by huge numbers of sites on the internet and a range of educational content. It is likely to be some time after the revised software is launched before version 10 becomes essential, but this is the type of web-browser upgrade that should be planned for by managers of large numbers of machines.
http://labs.adobe.com/technologies/flashplayer10/

Microsoft's rival to Adobe (formerly Macromedia) Flash is Sliverlight. This is also designed to be a cross-platform application for video and multimedia development, delivered through a web-browser plugin. Flash currently enjoys wider support, but Microsoft is keen to increase uptake of Silverlight.
http://www.microsoft.com/silverlight/default.aspx

**New memory technology in graphics cards**

Cutting edge computing performance is often found in the graphics technology driving modern PCs. A graphics card aimed at high-end applications will be equipped with fast processors and a generous amount of high speed memory. Memory technology is an area of innovation, both for specialist applications like this and general purpose computing. Two of the major players, AMD and Nvidia, are adopting

different approaches to system memory.
Graphics Double Data Rate, version 5 (GDDR5) memory is to be used by AMD for their latest ATI Radeon graphics cards. This is expected to push the performance of their cards further. Competitor Nvidia is currently using GDDR 3 memory in its products but is also exploring GDDR5. Graphics cards are key to doing more than just playing games. They can be used in graphical modelling, CAD-CAM, visualisation, image processing tasks and playing HD content.
http://news.cnet.com/8301-13924_3-9949658-64.html

**Next-generation games console update**

Video games consoles are part of a huge market, estimated at nearly $10m in 2007 and continue to be one of the most popular forms of home computing. The battle for dominance has been between the Nintendo Wii, Sony PlayStation 3 and Microsoft's Xbox 360. Analysts at Cnet news.com have been looking at the market issues and analysing how the winner could be considered the Nintendo Wii which rejected cutting edge hardware for usability, understanding its audience and innovative controls. The Wii has appealed to a wider casual games audience.

The lesson here is that raw power is not always the most important thing in design – whether that be for a games console, software application or learning content. The numbers of devices being sold mean that support for consoles – with their often limited applications – may be essential for educationalists looking to reach non-engaged households, but there are issues with the limitations of the devices and the relatively low-quality display options offered by a standard TV.
http://news.cnet.com/8301-13772_3-9948454-52.html?part=rss&subj=news&tag=2547-1_3-0-5

**Chip makers unite to define unified home network technology**

Intel, Panasonic, Texas Instruments and Infineon have launched a bid to steer the development of a unified home networking platform - technology capable of combining coaxial, powerline and phone cabling.

The increased integration and networking of home-media has encouraged a number of major manufacturers to come together in the HomeGrid Forum. Similar in approach to the Wi-Fi Alliance this group hopes to ensure that standards development work carried out by the ITU is suitable to encourage interoperability between devices. The focus of the group is to develop communications protocols that allow network information to be shared across powerlines, coaxial and phone lines irrespective of the type of cable being used. This could allow devices to be more easily connected. Wireless is the major alternative to this approach, but cabling is likely to offer higher capacity, easier troubleshooting and will be less prone to interference and congestion. The ITU working group is not expected to produce a final specification until 2009.
http://homegridforum.org/

## Hardware

### Analysis: Robots in education

As well as being a staple of science fiction stories, robots have become essential parts of modern manufacturing and are being increasingly found in education. Robots can take many forms, both virtual and physical, but a shared key attribute is that they appear to (and may indeed) possess some autonomy of action based on their programming. This article looks at physical robots and does not cover software agents.

In more advanced robots, actions emerge as a result of programming, but in some cases 'robots' may be little more than complex remote controlled units. An example of the former would be a factory automation unit, such as used to assemble cars in the motor industry. An example of the latter would be found in the popular TV show 'Robot Wars' or in bomb disposal droids used by the military. Military droids are often operated at further-than-sight-range and use some kind of telepresence. Telepresence may be as simple as a camera and viewscreen, or might use some kind of virtual reality system. Examples of telepresence can be found in the unmanned submersibles that explored the wreck of the Titanic and in the Bradford Robotic Telescope (http://www.telescope.org/) which offers users the chance to manipulate remote telescopes. Telepresence systems range from simple to complex. Military drones commonly use video cameras and controllers similar to games consoles. A simple application of light sensors may also be integrated – for example automatically turning on lamps when ambient light levels fall so the operator can still see. More complex telepresence includes feedback-enabled controllers that provide tactile as well as visual feedback; or more immersive 'heads-up display' style helmet units or dedicated suites with multiple screens. This was covered in more detail in TechNews March 2008.

Beyond control through remote operation there are a number of other methods of controlling robot behaviour. The most common is through some kind of programming. This involves setting a series of rules for a robot to follow, then releasing it. The programming may be simple, such as found in a Logo-controlled Turtle; or massively complex such as found in a autonomous robot vehicle as demonstrated in the DARPA Grand Challenge.
http://www.darpa.mil/GRANDCHALLENGE/overview.asp

There is established educational potential in using robots for studying control technology and developing logic and programming skills. For example Logo allows students to learn the basic principles of computer programming along with mathematics. This can be done on screen, or even on paper – but a physical robot is found to be much more engaging by many learners. Developing code to control all robots has its foundations in these simple commands and principles.

An extension to simple non-conditional programming is the use of sensors. Sensors introduce conditional cases to robot behaviour and give the appearance of context

awareness. For example a home vacuum cleaner robot may have a sensor to detect walls and obstructions and stop before running into them. A range of sensors may be used by robots including ultrasonic, contact, accelerometers, cameras, scanning lasers, humidity detectors and light sensors. These range in cost and complexity as well as application. For example cameras may be most effective when combined with some kind of image processing or facial recognition software. It is easy to see how sensors can add complexity to programming as well as offering new opportunities. Some technologies from the robotics domain have developed and been used in wider applications. For example some machine vision technologies are used in image recognition applications.

One of the aims of advanced robotic research is linked to machine learning and adaptability. Robots equipped with these functions are able to try different tools or approaches to completing tasks and where appropriate learn from previous attempts to improve subsequent efficiency. This links into many advanced areas of computer science, such as artificial intelligence research.

Most educational users, especially in schools, are limited to conditional programming and the use of sensors, but often highly creative solutions can be developed with these tools.

Three common types of mass produced robot are Turtles, LEGO and home-robots like Sony's now defunct Aibo. Turtles, as discussed above, are simple robots able to follow commands given using the Logo programming language.

Perhaps the most widely used robotics kit in an education context is LEGO Mindstorms and its variations. These kits include a range of robotic components including a programmable control unit, batteries motors and sensors. A whole range of national and international competitions take place annually using these kits to create all manner of complex robots.
http://mindstorms.lego.com/

Consumer robots currently have limited market penetration. The best known is Sony's AiBo range which was first released in 1999 and discontinued in 2006. These were marketed as robotic pets but have found wider use as programmable units with the release of a developer's kit. Even without specialist programming the AiBo emulates simple machine learning – for example by learning to recognise a number of voice commands. Several advanced AiBo programming tools have been developed by universities as part of artificial intelligence research and AiBo matches have been part of the RoboCup robot football competition.
http://support.sony-europe.com/aibo/
http://www.robocup.org/

At the BETT show in 2008 a robotic product won the award for primary and secondary hardware. Robosapien from Wowwee Ltd took the award for their humanoid robot. Robosapien V2 is a programmable robot that engages students across all key stages. From introducing students to control technology to more sophisticated programming routines, Robosapien encourages creative responses

and experimentation. The device uses infra-red control technology and has hand-like manipulators for large and small objects. The independent judging panel found Robosapien easy to use, with a familiar style of handset and useful support materials. It was seen as engaging and motivating because there is an instant response from the robot from first use and any new user can make the robot respond through experimentation. A video of Robosapien being used in teaching is available here:
http://www.bettawards.co.uk/bett_awards/winners_video2008.htm

There is good evidence of the positive impacts of team projects of this kind on personal and social confidence as well as learning. Robots are able to offer young people real hands-on technology that can engage and stimulate. Programming and building robots is multi-disciplinary and uses a range of skills. The uptake of Science, Technology, Engineering and Mathematics (STEM) is a focus for the UK's long-term economic benefit and robotics may offer a potential lever to interest and engage young people in these areas of study.
http://www.roboteducation.org/

The future of robots in the long-term is linked with machine learning and artificial intelligence. The organisers of the RoboCup competition expect that by 2050 they will 'develop a team of fully autonomous humanoid robots that can win against the human world champion team in soccer.' In the short term, key developments in some areas are driven by military needs. Already robot planes are able to successfully complete mid-air refuelling and land on aircraft carriers. Bomb disposal roles are in high demand in current conflicts and drones, effectively remote controlled robots with telepresence, are now widely used.

One of the highest profile robot competitions is the DARPA Grand Challenge. The 2005 challenge involved autonomous vehicles being challenged with a 11.78km course across the desert. The 2007 follow-up was a 96km route through an urban area and required the robot cars to negotiate a course complete with other traffic and follow traffic rules. The lessons from this will bring us closer to safer autonomous vehicle travel in both civilian and military spheres.

Using robots in education is not, as some would suggest, about replacing teachers with androids. Rather they are an exciting tool that can be used to engage and motivate young people by bringing technology and its applications to life. As societies grow older it is likely that robots will find a place as a more common assistive technology, though this will likely be through robotic technology being integrated into other things rather than through stand alone units. Japan, with its quickly ageing society, is leading developments in robotics. However, the humanoid robots showcased in Japan may not be so culturally acceptable in the West. Indeed, one of the key questions about the wider use of robots will be about how humans trust and react to them.

## Hardware news

### Mobile device update

Mobile Internet Devices (MIDs)- due for launch in June- and Ultra Mobile PCs (UMPCs) are playing an important part in the computing plans of many manufacturers. Intel claims that MID portable PC devices, based on its Atom processor, will be capable of running Microsoft's Windows XP and Vista operating systems as well as Linux. It is also expected that this generation of devices will have significant support for wireless technologies, potentially combining WiMAX, Wi-Fi and a GSM/3G mobile phone support.
http://www.networkworld.com/news/2008/040208-idf-mids-will-run-windows.html

Intel has launched the next generation of its Classmate PC. The new unit is expected to be migrated later this year to Intel's next generation ultra mobile processor, Atom, but for the moment this upgrade includes a larger screen and slightly updated processor. The Classmate PC which can have a 7" or 9" 800 x 480 display is designed for emerging markets but is also available to consumers worldwide.
http://www.reghardware.co.uk/2008/04/03/idf_intel_launches_2g_cpc/

One to one personal computing has been trialled in education projects. One of the latest large scale roll-outs is at the New Line Learning Academy in Maidstone. Here all Year 7 and Year 8 pupils have been given a Samsung UMPC device for use in their lessons and at home. The aim is to increase access to personalised learning and improve opportunities for collaboration and communication.
http://www.localgov.tv/cgi-bin/details.pl?action=prog&id=356

Microsoft has announced that it has agreed with the One Laptop Per Child (OLPC) project to produce a version of Windows XP for the XO '$100' laptop device. This has received a mixed response from some in the development community who feel that a 'general purpose' system like Windows will be less effective at achieving the project's aims than the existing Sugar learning interface. However, others believe that the inclusion of Windows will be crucial to widespread take up of the devices. A dual-boot Windows/Linux solution is expected later in the year.
http://www.informationweek.com/news/windows/operatingsystems/showArticle.jhtml?articleID=207800623
The OLPC has also announced the next generation XO-2 device that is due for launch in 2010. It will b a dual touch screen device, with no keyboard and has a target price of $75. However, the current XO that has a target cost of $100, actually costs $188.
http://www.itworld.com/Comp/1290/olpc-announces-xo-2-laptop-080520/index.html

### High capacity holographic drives due for launch

Holographic data storage is due for mainstream commercial launch. InPhase Technologies has spent many years developing its high-capacity storage solutions for back-up using holographic data storage on 5.25" disks. Their solution has finally

been demonstrated with an initial 300GB capacity, though it is expected that this will increase to 1.6TB of data capacity and offer throughput of 120MBps. High capacity write-once, read many (WORM) storage like this competes against reusable tape devices for system backup. The major advantage of this is a 50-year lifespan which is important for some applications. Otherwise the cost of the disks and drives - $18,000 and $180 respectively – will be too expensive for more widespread use. Holographic storage was covered in TechNews May 2005.
http://www.inphase-tech.com/

**Hard drive storage news**

Education applications require increasing amounts of storage for multimedia work. As well as increased capacity, other characteristics such as low power-consumption and portability are demanded for ultraportable, personal-owned devices that are likely to have an impact in education.

An emerging generation of notebook and sub-notebook devices are using solid state drives (SSDs) to offer improved performance and lower power consumption. Initially these drives were slightly larger than the traditional 2.5” notebook hard drives they replaced and much lower capacity. Improvements are ongoing and vendor Super Talent has announced a 256GB SSD that is only slightly thicker than a normal unit. This shows the speed of development, which should be matched by increased affordability as mass-production and the market demands increase.
http://www.supertalent.com/home/press_release.php

Notebook drives are typically slower than their desktop equivalents – running at 5400rpm rather than 7200rpm or faster. This can affect the seek-time to find files for access. Often the speed is kept lower on notebooks to increase power-efficiency and battery life, and faster 2.5” drives tend to be lower capacity. Fujitsu claim that their new 7200rpm drives are large (320GB) and use close to the same power as 5400 equivalents. The fastest enterprise hard disk drives operate at 10000 or 15000rpm.
http://www.fujitsu.com/global/news/pr/archives/month/2008/20080324-01.html

The advantages of 2.5” notebook drives can have wider applications. Buffalo have launched a new NAS (Network Attached Storage) unit that uses 2.5” drives to offer on-network storage in a fanless, low-noise, low-power consumption unit. This is available in 500GB and 1TB configurations.
http://www.buffalo-technology.com/products/network-storage/linkstation/linkstation-mini/

Portable external hard drives are nothing new, but Iomega have announced a new product that can output audio-visual data direct to a television or AV system without the need for a computer. This is similar to some media players, but without any expensive screen or battery for mobile viewing.
http://www.iomega.com/about/prreleases/2005/111505_screenplay.html

**Parallel programming concerns**

Some 40% of laptops and desktops shipped in 2007 included multicore processors. According to developers at Intel this can raise significant challenges to programmers

and hardware manufacturers alike as they seek to make best use of this computing power. Intel and Microsoft have announced funding to support training of programmers to enable them to use parallel cores effectively. This requirement is likely to continue to grow as multicore chips continue to become the norm in all notebook and desktop computers. Software that is not written to take advantage of parallel processing gains little advantage from multicore chips.
http://www.itworld.com/AppDev/programming-for-multicore-chips-080402/index.html

AMD have announced that they intend to offer chips with six cores on them in 2009 followed by a jump to 12 core chips in 2010- missing out 8-core chips altogether.
http://www.itworld.com/Comp/1986/amd-plans-12-core-chips-080507/index.html

**Mobile phone update**

Researchers at NTT DoCoMo in Japan have announced the first steps towards integrating bio-sensors in mobile phones. They suggest that sensors in phones will become able to analyse biological information in sweat and similar material to monitor users health.
http://wireless.itworld.com/4267/bio-sensing-cell-phones-080328/page_1.html

The European Union has cleared the use of mobile phones in-flight on planes. Emirates Airlines has already seen the first authorised in-flight call and now these changes in European rules means there may be a significant increase in take-up.
http://wireless.itworld.com/4279/mobile-phones-on-airplanes-080407/page_1.html

Samsung have released a new phone unit which provides touch (haptic) feedback. This can give an additional dimension to interaction and shows how a range of new interface technologies are being driven forward by the rapid developments in the mobile technology sector. Touch feedback is not currently widely used in devices but could have a range of applications.
http://wireless.itworld.com/4267/samsung-anycall-haptic-080325/page_1.html

Another new Samsung product is a large wireless tablet designed to take advantage of emerging wide area wireless broadband technologies such as WiMAX. The SWT-W100k has a 4.3” screen includes GPS, camera and Bluetooth as well as support for mobile digital television using the DMB standard. Wireless devices like this could partner with standards based online content to deliver educational content virtually irrespective of location.
http://www.engadget.com/tag/wibro/

**Open source driver developments**

Leading computer manufacturers, including Dell, HP and Lenovo have agreed to ‘strongly encourage’ their component suppliers to support open source drivers to make adoption and use of Linux on their systems easier. These announcements were made at the Linux Foundation’s Annual Collaboration Summit designed to increase systemic adoption of open source software.
http://linux-foundation.org/weblogs/press/2008/04/24/linux-foundation-reports-highlights-from-annual-collaboration-summit/

**New battery technology safer and more efficient**

Manufacturers have, over the years, tried a number of different technologies to get more power, safely, to mobile devices. Fuel cells have so far failed to reach commercialisation, so the lithium-ion battery remains the most popular solution. ZPower has announced developments in rechargeable silver-zinc batteries that are claimed to offer a 40% increased charge density making them suitable for smaller form-factor devices. The units are also 95% recyclable and are non-flammable unlike lithium batteries. These units are likely to be higher cost than existing equivalents thus initially restricting their applications to 'premium' products like ultra-thin laptops. They are expected to be released to device manufacturers in August.
http://www.zmp.com/

**New and high performance computing news**

Until recently there were three major components in electronics - the capacitor, resistor and the inductor. Years after it was first theoretically proposed, researchers at HP have managed to build a functioning fourth component - a memristor. This is like a resistor, but the resistance varies based on the amount of charge that has previously passed through it and retains this information when power is turned off. This could therefore have applications in non-volatile memory. This technology is a long way from commercial applications, but could be very significant.
http://www.hpl.hp.com/news/2008/apr-jun/memristor.html

Intel and Cray have come together to announce plans for new, multi-petascale supercomputers. The proposed devices will be based on Intel processors and Cray scaling technology to allow large numbers of powerful processors to combine on high-intensity computing tasks. Petascale computing is concerned with systems able to perform more than 1 quadrillion operations per second. The most powerful current generation of supercomputers offer between 0.5 and 0.8 petaflops.
http://investors.cray.com/phoenix.zhtml?c=98390&p=irol-newsArticle&ID=1135744&highlight=

IBM researchers are continuing to develop new memory technologies. One such approach is called Racetrack memory which uses magnetic properties of 'spinning electrons (spintronics) running through nanowires. This is a non-volatile memory that keeps its information without ongoing power. Although at a very early stage, the memory is expected to offer performance at least equivalent to modern RAM, but without the requirement for continuous power to retain data. The technology is not expected to reach commercial applications for at least six to seven years, but high performance non-volatile memory could support a range of 'instant on' devices removing the start-up time of computers.
http://www.almaden.ibm.com/spinaps/research/sd/?racetrack

Consultants McKinsey have released a report that proposes a rating scheme for servers. They suggest that the increasing emphasis on energy use would benefit from a clear, easy to use approach rather than burying power consumption data deep in spec sheets. They suggest an agreed metric, equivalent to mpg for cars, to take into account a range of issues. Whilst it is unlikely to be adopted widely by

vendors it does show how seriously these issues are being taken across the business world.
http://www.news.com/8301-11128_3-9932184-54.html

**Human computer interaction update**

New methods for humans to interact with and control computers are developing as a result of more ubiquitous computing. Developers at RallyPoint have proposed a system that uses sensors in a glove to control a computer for communications and weapons control. They suggest that flexible circuitry in the clothing can allow gestures to be easily translated into commands. This could potentially be linked to a helmet mounted display. Military applications and development money will continue to drive this kind of work, but all companies involved will be thinking of the general purpose mass market.
http://www.rallypoint.info/docs/hcid.pdf

Another key market for computing is entertainment. TN Games have launched a special gaming vest that provides physical feedback based on in-game consequences. For example weapon impacts will be felt as air pockets on the vest expand and contract to give feelings of pressure. At the moment this technology is quite basic, but could herald more rounded interactions and feedback between humans and computers. This could support a range of educational applications around computer-based experiences and simulations.
http://www.tngames.com/products.php

Microsoft is expected to offer improved speech and handwriting recognition inits next version of Windows, as well as adding support for multi-touch interfaces.

See Becta's Emerging technologies for learning (2006) for an exploration of how developments in HCI relate to education.
http://partners.becta.org.uk/index.php?section=rh&catcode=_re_rp_02&rid=13768

**Becta procure the technical support service for the information standards board (ISB)**

Becta is managing the contract for the Technical Support Service (TSS) for the newly launched Information standards board (ISB). The ISB governs information and data standards across the whole of education. The TSS contract has been awarded to Atkins Limited under the Becta Technical Consultancy Framework Agreement. There will be a formal launch of the TSS in mid-June and it will then support work on about two dozen standards over the next couple of years, coordinating Special Interest Groups, Supplier forums and the 23 partners organisations, as well as other stakeholders. The work will be underpinned by a website portal, collaborative workspace and comprehensive centralised standards registry with machine-readable components.
http://www.dfes.gov.uk/pns/DisplayPN.cgi?pn_id=2007_0184

## Software and internet

### Analysis: ICT to improve parental engagement: towards online reporting

Although many schools have been looking at ways of improving automated communication with parents, the announcement at BETT 08 by Jim Knight, Minister of State for Children Schools and Families, has shone a spotlight on this area. The minister announced that from September 2008 all secondary schools will be expected to provide information to parents covering achievement, progress, attendance, behaviour and special needs, on a timely and frequent basis – this should be at least once per term. By September 2010 all secondary schools will need to offer parents online access to this information (including the opportunity for secure online access) wherever they are and whenever they want. Primary schools must meet the basic requirement by September 2010 and the online requirement by 2012, though many are already on this journey.

The Department for Children, Schools, and Families (DCSF) has focused attention on areas such as absence reporting, homework, behaviour and performance, with reporting being a tool to improve communication and engagement with parents. There is no one solution and best practice will vary depending on local context and the needs of the local community. This will mean the use of different technologies and functional features in different schools. At a basic level it might mean simple and secure access, via the internet, to core information such as attendance and behaviour (both positive and challenging), progress, attainment and special needs. Although some of this information may only be updated by schools on, say, a termly basis, parents will have the freedom to access available online information when they please. Schools might want to provide parental access to systems where information is more frequently updated such as information held on a Learning Platform or build on the use of mobile technologies and text messaging to provide more timely information about attendance, behaviour, achievements and events.

Much has been made of the term ’real-time reporting‘ particularly in the press, but the intention is not necessarily to increase the level of reporting beyond what is already good practice in many schools, but rather that schools consider and use all the opportunities that ICT offers to improve engagement with parents. It is the engagement of parents in their children’s learning and in particular, meaningful dialogue between parents and their children that has been shown to have an impact on achievement. Neither does information necessarily need to be made available in real-time, in the sense that the parent receives a report as soon as an event happens, but rather it concerns relevant and meaningful communication to the parent in sufficient time to allow them to act upon the information. The principles of online reporting are that information should be timely, meaningful and manageable. Schools, in partnership with parents and the wider community should make their own decisions about the appropriate frequency of reporting for the learner information that is held.

### School IT infrastructure

In order to facilitate home school reporting a school will require a solid infrastructure of management information and learning technology. This could include electronic

registration systems, Management Information Systems (MIS) with timetabling modules and virtual learning environments. These could be deployed separately or integrated together in a single managed learning platform. The intention is not to overburden schools with new data collection requirements, but that existing systems that hold learner data can more easily make available or send that information to parents. Schools will benefit from finding solutions that allow data to be entered once but used many times to impact upon the quality of learning and teaching.
The focus is on making better use of the existing information and infrastructure, not suggesting onerous or expensive system upgrades.

**Current examples**
Currently, schools and colleges have operated both push and pull systems to communicate with parents, either via SMS and e-mail (push) or requiring the parent to log-on to a web site (pull). In many cases the reporting systems are completely separate applications from the school records systems, importing files from those systems to generate reports. The more sophisticated MIS and registration systems can include automated SMS alerts regarding attendance.

The teachers2Parents system for example offers fairly basic integration, with a contact list of parents, students and their teachers being imported into the system. Teachers associated with that pupil can then send individual or mail merged text messages to parents. This allows a variety of different message types to be sent to the parent and does not rely on a single administrative system to generate reports. Others such as School Reports Online allow more information to be imported from the local MIS, but lack the push style SMS communication. Other schools management systems such as Capita SIMS, Facility MIS, BromCom and Open source systems such as school tool and FreeMIS, incorporate parental reporting modules. For the most part these are web based online reports, requiring other systems to send SMS messages.
https://www.teachers2parents.co.uk/public/teachers/login.html

These systems have been used quite effectively when targeted at students. Brockenhurst College, for example, has made extensive use of SMS messaging to engage their students as well as contact parents. This can be combined with text to voice systems to allow voice messages to be sent to land line phones.

Where there is more than one system, such as registration and behaviour, or timetabling and virtual learning environments, there is a danger that each system will use a different method for communication and a certain level of systems integration or process management will be required to create consistent reporting. However, interoperability between systems is expected to continue to improve and is being encouraged through channels such as Becta's specifications. The functional specifications for MIS and Learning Platforms are held by Becta and regularly updated based on consultation with users and the supply sector.
http://industry.becta.org.uk/display.cfm?page=1819

The information that might improve parental engagement is not limited to information stored on an MIS however. A number of schools are now using their virtual learning

environments (VLE) or learning platform to communicate with parents. Learning platforms often contain information on classes a student attends, homework that has been set and calendars of events. This information can also be made available to parents through the platform, using a separate parental log on. Different approaches have been taken to publishing learning platform content online with some schools requiring passwords others making public all non-sensitive data. Schools have used learning platforms to host consent forms for school trips, exam timetables, and general notices to parents. To aid consistency, the learning platform could also be used to host reports of achievement and school reports, and the ability to host either web pages or files of any type including Word and PDF means that a school does not have to create a new dynamic website.
http://vle.ameryhill.hants.sch.uk/

**Communication Methods**
Parents are naturally concerned that sensitive data concerning their child is not made public and strong encryption and password protection is recommended for HTML based communication. Encryption is possible, but slightly harder for e-mail communication, with secure e-mails experiencing difficulty with web based and local e-mail clients. Secure e-mail can also be used to by-pass networked mail scanning and virus scanning software, as the messages are encrypted and not readable as they pass from sender to receiver. In that regard it is safer and easier to use e-mail to alert a parent to new content on a web portal rather than send content directly.

This method has been successfully used by a number of pilots including Djanogly City Academy in Nottingham and Cardinal Wiseman Catholic Technology College in Birmingham. Both Schools used online reporting to promote a dialogue between parents and teachers based on easier access to already collected data on performance, attendance, timetabling and general event logging. Cardinal Wiseman school found that around 35% of parents access the system, which lead to a requirement for other communication methods including paper to be used. Importantly the reports are all generated from the same base system, so the information is consistent whether it is presented on-line or off-line.

Where SMS has been used it has proven to be an effective means of communicating with both students and parents. More students and parents have mobile phones than internet connected computers. Certainly when reporting absence, parents are more likely to be near a phone than an internet connection. Quilley School of Engineering in Hampshire has used SMS messaging to effectively tackle absenteeism. To do this they had to implement an electronic registration system for all classes, and ensure that attendance data was entered promptly by teachers. Together with the IT infrastructure the school also created an attendance team and put in place a dedicated attendance officer to monitor and report on attendance. All these measures have decreased absence from 15% to 10%.

Schools collect a vast amount of data, much of which would not be relevant or appropriate to pass to parents. Alongside choices of technical system and communication method, a school should develop a clear view of what parents want and will find useful. This will often not be as simple as an automated routine and may

require an element of human intervention. As parents become more familiar with reporting and their engagement improves this requirement may be reduced. Any process introduced by a school must be sustainable.

**Conclusion**
What is new regarding online reporting is not so much the data that is collected or the technology that is used to communicate it, but the combination of the two together providing a more timely and responsive means of informing parents about their children's progress. Successful projects such as Quilley School and Cardinal Wiseman, have used a mix of technologies including paper to ensure that the most appropriate communication method is used for each parent and each type of report. What is required, is a solid base of management information, as communication can only happen where data is available. Efficient data collection systems are a key element of making parental engagement manageable. In that sense it is about making full use of the technology that is available to offer parents the ability to engage with the school in a way that they feel comfortable. As the use of the internet and mobile technologies increases as part of every day business and home activities then this will inevitably raise parent's expectations for online information from schools.

Further information and support can be found at the links below and Becta will be producing further support and guidance.
http://schools.becta.org.uk/index.php?section=lv&&catcode=ss_lv_eff_mar_03&rid=14571
http://localauthorities.becta.org.uk/index.php?section=eo&&catcode=la_par_01&rid=14574

## Software and internet news

### JISC Collections for schools gives access to online content

A landmark Becta-funded initiative called 'JISC Collections for Schools' has been launched to give UK schools access to millions of online images, newspaper archives, dictionary entries, and art, music, history and science resources for a fraction of the original cost. JISC Collections for Schools will allow schools to use invaluable resources from a range of trusted, high-quality online subscription services at a specially negotiated discount rate. Thanks to direct negotiation with publishers by JISC Collections, discounts of up to 75 per cent are available to schools. Eleven resources including the Guardian and Observer Digital Archive, the Times Digital Archive, the Oxford Dictionary of National Biography, and the Education Image Gallery will be available to primary and secondary schools, including Academies. The online resources were selected according to strict criteria, including proven quality, usefulness, value for money, and fit with the National Curriculum and A/AS syllabi.
http://jcs.nen.gov.uk/

**Microsoft OOXML approved as standard; ODF support to be added to Office**

The International Organization for Standardization (ISO) has announced that Office Open XML (OOXML) document format has received the necessary votes for approval as an international standard. Microsoft is keen that their products support open standards as this is being demanded by a range of customers especially in the public sector. This is a step towards adoption as a finalised standard, which is expected to happen later this year.
http://www.microsoft.com/presspass/press/2008/apr08/04-01OpenXMLVotePR.mspx
The ISO standard version of OOXML differs from the file formats currently implemented in Office 2007 products. Microsoft plans to support the new ISO approved OOXML standard in the next version of Office, code-named Office 14. The company also announced that it will add native support for the ODF and PDF file formats to its Office suite with the release of Service Pack 2, scheduled for Q1 2009. Microsoft say 'customers will be able to open, edit and save documents using ODF' and save into the .pdf format. The Service Pack will also allow users to select ODF as their default file format.
http://www.microsoft.com/Presspass/press/2008/may08/05-21ExpandedFormatsPR.mspx

Pending the outcome of the Commission's investigation, and the response of the wider marketplace, Becta's advice to schools and colleges in relation to the use of Office 2007 and the OOXML file format remains as set out in the Final Report into Vista and Office 2007. That report confirmed:

- No widespread deployment of Office 2007 should take place until schools and colleges are sure that they have in place mechanisms to deal with interoperability and potential digital divide issues set out in the report.
- To ensure widest compatibility of files between different applications, users of Office 2007 should not save any files in Microsoft's new Office format (OOXML).
- Due to limitations in Microsoft's implementation of the Open Document Format (ODF) international standard, users should in the short term continue to save files in the more widely adopted .doc, .xls and .ppt formats.

**Microsoft update**

Microsoft has announced that their Windows XP starter edition operating system will be available for certain ultra low-cost personal computers (ULCPCs) until June 30, 2010. The ULCPC is a loosely defined category of devices and Microsoft has set maximum specifications for devices to be allowed to run XP starter edition.
http://www.microsoft.com/presspass/features/2008/apr08/04-03xpeos.mspx

The widely anticipated Windows XP Service Pack 3 for the operating system was released to manufacturing on 21 April. The Service Pack includes a number of system patches and new features, including security enhancements.
http://www.microsoft.com/downloads/details.aspx?FamilyID=68c48dad-bc34-40be-8d85-6bb4f56f5110&displaylang=en

Microsoft has announced a new approach to synchronisation. ‘Live Mesh’ is designed to help users share and synchronise digital content across a range of different devices. At present, the service only supports Windows XP and Vista, but support for other devices is planned in the future. Mesh is part of Microsoft’s interest in cloud/utility computing where Live Mesh offers object synchronisation potentially including online storage to enable access to data from any location and device.
https://www.mesh.com
http://www.itworld.com/AppDev/1513/microsoft-reveals-mesh-080423/index.html

Microsoft has launched aversion 6.1 of Windows Mobile and will shortly release an updated version of Internet Explorer Mobile with support for Adobe’s Flash and Microsoft’s Sliverlight. Also recently announced is the ‘Albany’ subscription service. Currently in private beta, this offers customers regularly updated security and productivity software bundled together.
http://www.microsoft.com/presspass/features/2008/apr08/04-18albany.mspx

**OpenOffice 3.0 beta arrives**

The Open Office 3.0 beta has been released, with a broad range of incremental feature enhancements, notably increased columns in the Calc spreadsheet application. Perhaps most interestingly, especially for educators who need to support Apple Mackintosh computers, the new beta version now runs on Mac OS X without the need for X11. This introduces some VBA support, and gives the application better accessibility support.
http://marketing.openoffice.org/3.0/announcementbeta.html
Version 3 of the popular Open Source internet browser, Firefox, is also currently in development. Release candidate 1 (test version) is now available and the final version is expected to be launched by the end of June.

**Social networking reports**

A new report from Ofcom on social networking advises that users are not especially concerned about privacy and safety. It further finds that the technologies available on social networking sites for managing privacy were difficult to use. This suggests that educators and IT staff with leadership on Internet issues within individual educational establishment need to be aware of best practise policies to raise young people's awareness of e-safety issues and equip them with strategies to mitigate the risks. The Ofcom research showed that 49% of children aged 8-17 who use the internet have set up their own profile on a social networking site. However, older children are much more likely to have a social networking account.
http://www.ofcom.org.uk/advice/media_literacy/medlitpub/medlitpubrss/socialnetworking/summary/

Also launched recently, the Home Office guidance on social networking provides good practice recommendations for social networking sites. It includes a helpful summary of some of the key legal issues and responsibilities, together with guidance for providers and users on good behaviour,
http://police.homeoffice.gov.uk/publications/operational-policing/social-networking-guidance?view=Binary

Social networking site Bebo has launched a site which helps teachers and young people explore e-safety issues. The company believes that teachers need to develop a deeper understanding of young people's use of social network properties in order to act as advocates of best practise to young people effectively.
http://www.bebo.com/Safety.jsp

**Web 2.0 update**

Analysts at Forrester have released research to coincide with the Web 2.0 expo held in San Francisco this April. The report estimates that business spending on technologies associated with the term Web 2.0 will grow dramatically over the next 5 years. This means for educators that the drive for using Web 2.0 tools in school will come from not only those who believe such tools are pedagogically effective, but from the business community as well. It also suggests that more mature and robust services will appear.

http://www.cafescribe.com/ is an example of a service that uses web 2.0 technologies in an educational context. The concept of a site that sells educational resources as e-books is a standard web 1.0 concept – targeted e-commerce. The interesting element of CafeScribe is the notes function, where users can add notes to their ebooks and check out notes from others. As the site increases the numbers of text books it offers, it will become more useful.

Intel has released a mashup tool called Mash Maker. Mashups combine data from different sources to create a new online service or tool. Development tools like Mash Maker and similar offerings from Microsoft and Yahoo make creating mashups more accessible. Currently many mashups concentrate on the visualisation of data, in particular displaying location tagged content, such as photos, on maps.
http://mashmaker.intel.com/web/

**Video games labelling changes**

The Byron Report, commissioned by the Department for Children, Schools and Families, has reported on the influence of video games on young people (see TechNews March 2008). One of the recommendations was an improved scheme for alerting young people and parents on the suitability of games for different ages. The EU-funded PEGI system already provides a structure for this, but despite being available since 2003, recent EU Commission research shows that only 2 countries, Germany and Lithuania, have specific laws governing the sale of video games. In the UK, the BBFC continues to work with PEGI to classify games as well as downloaded video content.
http://www.dcsf.gov.uk/byronreview http://www.pegi.info/en/index/

The EU is holding a consultation on the implementation of PEGI and converging the various systems in place across Europe. This hopes to achieve a consistent standard and to raise the profile of the system in member states.
http://www.eurunion.org/eu/index.php?option=com_content&task=view&id=1738&Itemid=58

A market research company has found that the Wii console encourages exercise and social bonding. The study claims that two thirds of parents believe social gaming has a positive impact on family life.
http://www.tnsglobal.com/news/news185D8B66AE3F44C3B60E79E03A469E24.aspx
The BBFC has announced that it is extending its work into rating downloaded videos. The service is called BBFC.online. The BBFC expects major distributors and retailers to join the scheme as soon as their systems have been updated. This is aimed at the Video-On-Demand (VOD) and internet delivered material sectors, currently quite immature – but expected to grow over time.
http://www.bbfc.co.uk/news/press/200805212.html

**Microsoft's Worldwide Telescope**

Microsoft has launched Worldwide Telescope software for download. This software allows users to view outer space using images from a number of ground-based telescopes and the Hubble Space Telescope. User can explore independently or follow a selection of educational tours.
http://www.worldwidetelescope.org/
Google has a rival product – Google Earth – which includes Google Sky offering astronomical views.
http://earth.google.com/
http://www.google.com/sky/

**Google Docs now works offline**

Google is extending the functionality of its Docs suite of online office software. Google's open source Gears technology can now be used to allow users to work on Docs documents offline. This moves Google Docs closer to direct competition with standard office productivity software. Google Gears is an application that includes a set of functions to allow online web applications to work offline, without a connection to the internet. This online/offline convergence is an interesting trend to watch and is complemented by increasing availability of data access, such as provided by mobile phone high speed data and wide area broadband like WiMAX.
http://docs.google.com/
http://gears.google.com/,

Online provision of applications such as productivity software is seen as an easy, manageable way to provide services where there is guaranteed connectivity. Microsoft has approached this idea from the other way, extending its traditional desktop productivity suite online through Microsoft Office Live.
http://www.officelive.com/

**Search update**

The major search companies continue to promote technical development to give an edge over their rivals. The second version of Yahoo's OneSearch, aimed at mobile phone users, uses voice as the search interface and offers location based search. Search results also include advice from Yahoo Answers. Yahoo aims to distribute One Search by deals with carriers, web download and as a service from web portals.
http://mobile.yahoo.com/onesearch

The company also plans to introduce support for key semantic web standards, including some widely known microformats, and RDF amongst other initiatives in the space. The semantic web aims to allow computers to extract meaning from web pages and so computerise more of the tasks of information retrieval, sharing and combining.
http://www.ysearchblog.com/archives/000527.html

Another company working in the semantic space is start-up Powerset. It is initially focusing on making Wikipedia search easier and more effective, by parsing and extracting meaning from Wikipedia entries. The company aims to bring the benefits of semantic search to a wider audience as its offering matures.
http://blog.powerset.com/

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