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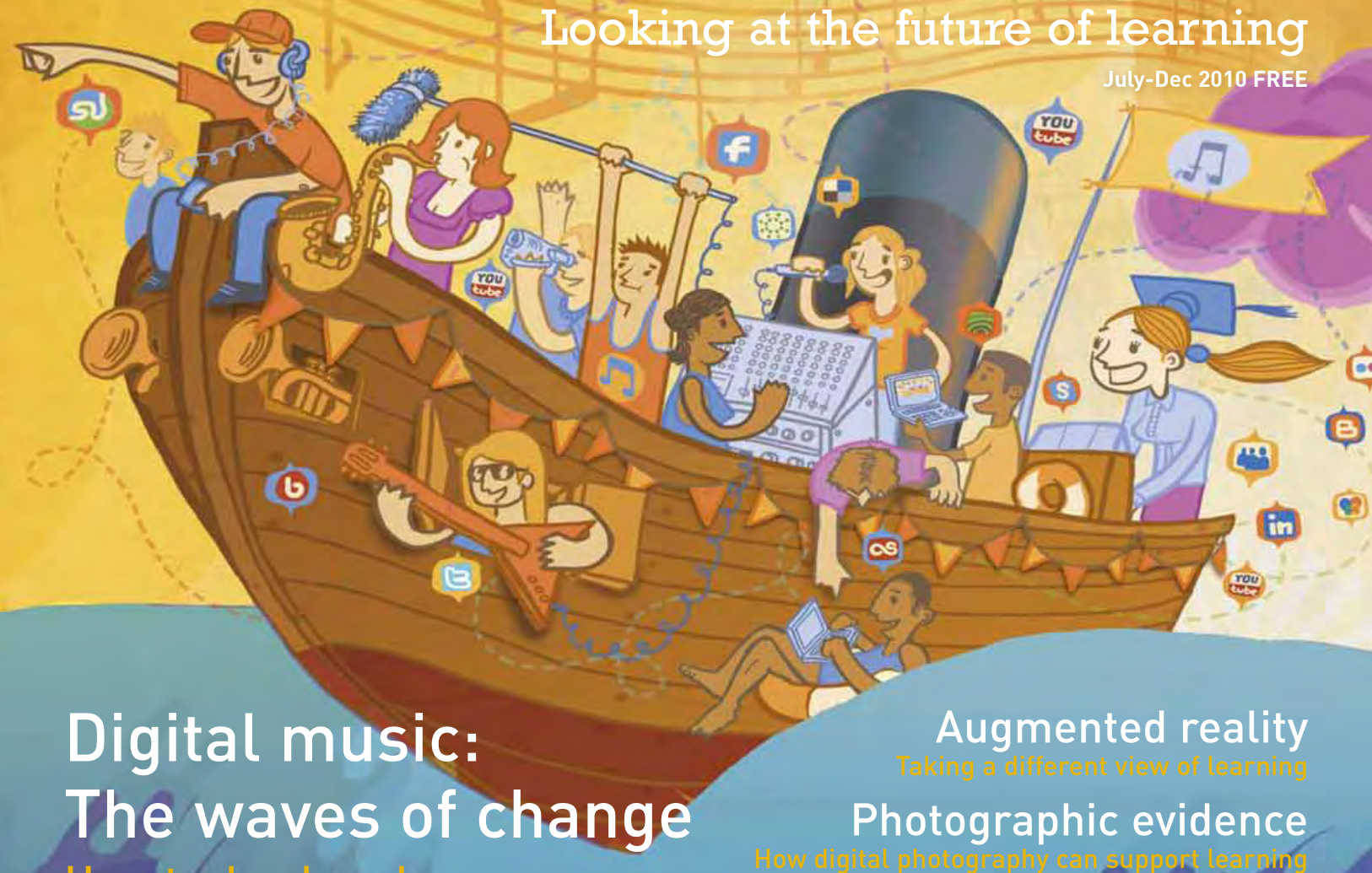

Digital music: The waves of change

How technology has transformed music teaching

Plus an interview with **Derek Robertson**, National Adviser for Emerging Technologies and Learning at Learning and Teaching Scotland

Augmented reality

Taking a different view of learning

Photographic evidence

How digital photography can support learning

Technology-supported assessment

Is it keeping pace with technologies for learning?

Let's get talking

How might technology give new life to discussion in class?

The great outdoors

Outdoor learning is an excellent complement to classroom learning

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Futurelab is a not-for-profit organisation that is dedicated to transforming teaching and learning, making it relevant and engaging to learners of all ages and backgrounds through the use of innovative practice and technology. We have a long track record of researching and demonstrating innovative uses of technology to enhance teaching and learning; of supporting education practitioners to adopt new teaching practices; influencing public policy in education; and developing and publishing reports and digital tools that have proved to be invaluable resources to policy makers and practitioners alike.

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Welcome to vision

The Swiss psychologist Carl Jung once said: "The creative mind plays with the objects it loves," and this is particularly true of education. Creativity is central to learning, supporting the development of skills but, as we've heard from Jung, it is more likely to come to the fore when we are passionate about the subject matter. In this edition of VISION, we hear from a multitude of educators about how they have been successful in 'switching on' their students' creative minds...

David Cleland, ICT coordinator at Wallace High School in Northern Ireland, proposes that digital photography is one way forward, offering "an easy, creative and exciting way to approach the curriculum." He suggests that photography has the potential to support learning in a range of subjects, and provides case studies of how this has been done at his school. Whereas, in the article about how new digital technologies are transforming music teaching, we hear that social networking sites such as YouTube may hold the answer. However, learning outdoors is put forward as the key to unlocking students' creativity in the article on page 16. The Real Ideas Organisation's Claire Honey explains: "Children enjoy themselves so much more when they're outside. It lends itself so much better to inspiration and exploration."

Learning and Teaching Scotland's Derek Robertson tells how he has used computer games to "make school a place where children want to be and where they can fulfil their potential." He goes on to explain how his cutting-edge vision for Scottish schools – using games such as Guitar Hero to teach subjects as varied as business studies, music and citizenship - has transformed the learning experience for thousands of students north of the border, stating that children will "think something's wrong with schools" if they don't use technology.

One specific technology we explore in this edition of VISION is augmented reality which is being used, in small pockets, up and down the country to offer learners more powerful learning experiences. With the ability to merge the real and virtual worlds, this technology is, in the words of ConnectEd's Mark Stimpfig, "a powerful pedagogical tool." Technology is the focus of the article on debate in the classroom too (page 6), asking how it might be used to breathe new life into the art of discussion, and looking at ways of supporting the development of this vital skill. The answer lies, perhaps, in taking more of a 'back seat' or as Don Rowe from the Citizenship Foundation puts it: "As teachers, we need to learn to talk less."

Which brings us back to Carl Jung, who also reminded us that "an understanding heart is everything in a teacher, and cannot be esteemed highly enough." A fact which is endorsed by the article on technology-supported assessment, the quality of which we are told "depends largely on the ability of the humans who are administering it". So, it seems, there are many ways to unlock the creative potential of our students, both with and without technology. But one thing is certain - the technology will not succeed on its own. We need the expertise, knowledge, inspiration and, above all, bravery of educators - working in partnership with learners and others – to turn the key.

Stephen Breslin
Chief Executive, Futurelab

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AUGMENTED REALITY IN EDUCATION: TAKING A DIFFERENT VIEW OF LEARNING

It's not often that you'll find teachers encouraging students to play with games consoles during lessons, but that's what happens at Sundorne School in Shrewsbury.

Students have been using portable games consoles (PSPs, to be specific) while visiting Wroxeter Roman city, to access information that brings the heritage site to life. As they walk around the site, the PSPs 'read' special printed codes, called 2D bar codes or markers, on the walls, and automatically display relevant information to students that includes text, audio, video and 3D images.

It's just one example of how augmented reality (AR) can be used in education to provide students with a richer, more powerful learning experience. "Augmented reality is a powerful pedagogical tool," says Mark Stimpfig, Managing Director of ConnectEd, which provides the Second Sight software that the English Heritage application is based on. "For me, it's the logical next step in blended learning."

AR is attracting a good deal of attention in the education sector, but the technology has actually been around for more than a decade, primarily in the health and military sectors. Put simply, it involves adding a layer of virtual information over the physical world. If there was a scale where the everyday 'real world' is at one end of the scale and 'virtual reality' - where everything is computer-generated - is at the other, then augmented reality would fall somewhere in the middle. Examples include seeing a 3D virtual image of a Roman villa on top of an archaeological site when you view it through a PSP screen, or details of the nearest petrol station overlaid onto a map viewed on your mobile phone.

Broadly speaking, current AR applications fall into three categories: marker-based, location-based and markerless. Marker-based applications use physical images that are printed out and placed into a physical environment – perhaps inside a book, or on a wall. The user then looks at the marker through a webcam or mobile device camera, and software inside the device 'reads' the marker, triggering the device to display a specific image, link or other content. Markerless technologies generally require lots of computing power in devices and analyse images in front of the camera, overlaying other information.

A location-based AR application is slightly different, because it doesn't require any external content to 'read'. Instead, the application relies on GPS within your computer or mobile device to know your location, and then provides relevant information. If a mobile device includes a compass as well as GPS, the application can also work out which direction you are facing, and therefore what you're probably looking at. It can then 'layer' virtual information over your camera view, such as directions, or geographical data.

Both of these applications have significant potential in the classroom. The Open University (OU) has jointly developed a location-based AR application with the charity Earthwatch, which their students used on a recent field trip to Nicaragua. The students travelled to South America to research a particular volcano. While on site, they gathered a range of data, including gravity and gas readings. This information was entered into an iPhone and automatically sent back to the university's server. "What then happened was the server collated the information from all the students on the mountain, and sent it back to the iPhone as data they could view through the camera," explains Peter Scott, Director of the Knowledge Media Institute at the Open University. "So when they looked at a specific part of the terrain, they could see the relevant readings from all the researchers on site, and as they moved or looked in another direction, the data automatically updated."

The value for students is really in being able to see information in different ways, Scott believes. "One of the key issues for students is understanding the nature of a problem – and using AR to literally put information into their world gives them a huge advantage," he says. "You're also providing an immediate feedback loop, in the field, which is very powerful."

"AR uses domestic technology that many of the students already have in their pocket"

The OU started experimenting with AR in 2009, building an augmented reality campus tour, where students could see additional information about buildings and what was inside them while walking around. "We found that so simple, and so compelling, and it uses domestic technology that many of the students already have in their pocket. So we're now keen to see where else we can support learning using AR."

Other educational establishments are using marker-based AR applications rather than location-based services - for example, ConnectEd's Second Sight, which can be downloaded from their website. The application provides 50 markers (in the form of barcodes) that can be linked to different sorts of media – video clips, audio clips, images, text – using a simple drag-and-drop tool. The ability for teachers, students and all users to create their

Above and below: PJ Hogan, Nicaragua

Above and below: ConnectED / Sundorne School, Wroxeter

own experiences is unique and empowers content creation. You can then print out the barcodes in whatever size you choose and place them in the real world, where students can view them through mobile devices.

"So you might add them into books to provide further context at key points, such as reading aloud some text from a Shakespeare play to demonstrate the original sound and rhythm," explains Stimpfig. "Or you could print them in a larger size, and place them on the walls of a museum or around the school, as part of a history project."

In addition, the Specialist Schools and Academies Trust (SSAT) has released a set of AR resources, which use markers to allow pupils to interact with a range of virtual objects. They include markers that show how muscles interact, and an application that helps students to learn what happens when different metals are combined.

AR technology actually originated in the military, where it was incorporated into headsets, explains Clive Longbottom, a service director with research firm Quocirca. Of course, an AR-enabled military headset might cost hundreds or thousands of pounds, so AR has traditionally been out of the reach of most organisations. So what's changed?

"What we're seeing now is a fall in the price of AR technologies and markers, and a corresponding increase in the power and capability of mobile phones. That, combined with the increasing amount of information that is available through things like Google Earth or Google Maps, represents something of a sweet spot for AR," Longbottom says, suggesting that the technology is now ripe for use in other sectors.

Traditionally, the cost of AR has been the biggest barrier to adoption in the education sector; however there are other costs to consider beyond the hardware, says Kieron Kirkland, a researcher at Futurelab. "The hardware can be expensive, of course, but you also need to consider the time it will take to get used to using new software, technical issues like the connectivity of mobile devices, and crucially teachers need time to plan and integrate the use of the equipment into their learning and teaching practice."

In the near future, however, the cost of both location-based and marker-based AR applications will tumble, predicts Michael Lewis, Head of New Media with Lewis, a communications company that has worked with several government agencies on AR applications. It's already possible to develop a simple AR application, that uses a technology called Flash, to run inside a web browser in a matter of days, says Lewis - although things that incorporate high resolution 3D images require more sophisticated computing programming, and are relatively expensive, he adds. "The cost of markers – particularly black and white rather than colour – is also coming down, so the whole thing is becoming more accessible," Lewis says.

As prices fall, programmers are already working on a new generation of AR applications that have exciting possibilities. For example, Ray-Ban recently trialled a service where consumers can visit the company's website, and facial recognition software uses the consumer's webcam to scan their face. The customer can then see an image of their face, with various sunglasses projected onto it – being able to try them on, in effect, without ever leaving home.

Another new AR application is the 3D AR experience. Rather than looking at layered information on a screen, users are instead immersed into a 3D virtual and physical environment. While these are considerably more expensive that your average iPhone application, the potential for providing fully-immersive learning experiences is huge, says Andrew Smith, Creative Director at Pimento Vision, a company that specialises in developing interactive applications.

The company is currently working on an in-store kiosk application for an international baby product manufacturer. The kiosk will feature a large screen with a camera positioned above it. On holding a pack of nappies up to the camera, the pack will appear on screen. A nappy will then 'leap out' of the pack and the user will be shown various benefits and features offered by that particular nappy.

However, experts agree that the biggest mistake you can make with AR is just using applications that look 'cool' but don't add any value to the learning experience. "Just because the technology is available, it doesn't mean you should automatically use it," says Kirkland. "But if you choose the right learning content then AR gives students the potential to go out and experience learning in a completely new way. It's potentially enormously powerful."

Pimento Vision

Pimento Vision

ConnectED / Sundorne School, Wroxeter

Getting creative

It is essential for learners to be creative, to generate new ideas and to be experimental in the application of those ideas. In this section, we celebrate those that do not always take the safe and proven route, but instead are committed to trying something truly innovative. Here are just some of the exciting creative ideas that have made us sit up and listen recently...

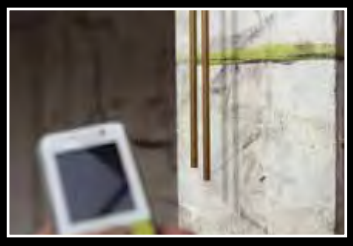
Merel Karhof

Knitting with a difference

The Merel Karhof design studio has produced a Wind Knitting Factory which uses wind to activate a knitting machine. Fitted to the outside of a building, it knits long rectangular shapes which are 'harvested' at regular intervals. The idea is that people will use the products from the machine (scarves) to protect themselves from the element that created them (wind). Each scarf comes with a label that tells you how much time it took to create and on which date.

www.merelkarhof.nl/merel_karhof_-_product_design/wind_knitting_factory.html

RCA/Shu-Chun Hsiao



Chime and chime again

Ever wish that the sound of a mobile phone ringing could be masked by something altogether more ethereal? Well, Shu-Chun Hsiao, a Royal College of Art student has created the EMF Chime that plays when it senses an electromagnetic field in the air, such as that created when using a mobile phone. Movements are made by the invisible force and the chime responds with a harmonious sound, ensuring that everyone notices the existence of electromagnetic fields.

hotelrca.com/Shu-ChunHsiao.html

Zilvinas Kempinas

From tape to tube

'Tube' is a work by Zilvinas Kempinas that creates a dramatic enclosed walkway over 80 feet long from stretched lengths of videotape. The work is one of the latest in a series that employs Kempinas's signature medium of magnetic tape; works that have inventively exploited the strength and ultra-lightweight nature of tape to create beguiling and seemingly contradictory physical spectacles.

www.spencerbrownstonegallery.com/Artists/Zilvinas_Kempinas/ZK_Venice.html

R&Sie(n)

What a buzz!

When an art collector in Trinidad wanted a home that would isolate him from fever-infecting mosquitoes, Parisian architects R&Sie(n) responded with a structure that was designed to both face and embrace one's fear of these insects. The house takes the form of a twisted horizontal tube in which exterior surfaces invert to become interior walls, and interior spaces intertwine but do not intersect. So, mosquitoes can enter the home and live close to the owner without sharing his space, all the while buzzing in a soothing, therapeutic manner.

www.new-territories.com/mosquitos.htm

Daisy Ginsberg

Synthetic beauty

The development of materials impregnated with bacterial and viral predators could mean that natural disease becomes a distant memory. But how will we contend with synthetic bacteria that escape from factories, DIY labs and broken products, and flourish or even mutate? Designer, artist and researcher Alexandra Daisy Ginsberg has been looking at the implications of synthetic biology on our lives. Her Synthetic Pathologies project takes a look at if and how synthetic infection might be profitable and even beautiful. For example, teeth subjected to poor dental hygiene could be transformed by brightly-coloured dots of dental plaque, a build-up from bacterially-produced colourants in pharmaceuticals and foodstuffs.

www.daisyginsberg.com/projects/syntheticingdom.html

David Bithell

Table manners

David Bithell, Assistant Professor of Composition Studies at the University of North Texas in the USA, is devoted to the exploration of the intersection between experimental music and theatre. The Liminal Surface is the result of a collaboration with the artist Ali Momeni, and uses a custom-built table-top surface fitted with audio, video, analogue and digital sensors, as well as computer-controlled external media (i.e. musical robotics). Performers, who sit on either side of the table, interact with objects on the table's surface so that both objects and musicians contribute to the performance.

www.davidbithell.com/works/theater/the_liminal_surface.html

LET'S GET TALKING

Most teachers acknowledge the importance of discussion in their classrooms, and the pre-election televised debates by Messrs Brown, Clegg and Cameron have perhaps gone some way to raising the profile of public debating among young people. But how can teachers stimulate discussion in lessons, encouraging young people to formulate and express their own opinions and to consider those of others? Furthermore, are these kinds of skills still relevant for today's young people, and are there ways in which technology can give new life to the art of discussion in class?

David Palmer teaches IT and personal and social education at Ackworth School, a Quaker school in West Yorkshire, where openness and the ability to discuss freely is a key part of the ethos. "Discussion is central to my approach, and I would like to think it plays a part in all my lessons now," he says. "It's a way of finding out where the students are and what they think... I try to be the instigator of the discussion, but then keep back and be more of a moderator, making sure no one student is dominating it."

Palmer's lessons often begin with discussion, followed by an online task, which will in turn be discussed in depth at the start of the next lesson. He hopes that the general election will be a topic for debate this spring term, linked to and stimulated by a new online resource produced by Parliament Education Services that has been designed to give young people a flavour of MPs' lives in

Westminster. 'MP for a week' is a game which can be played individually or in pairs, in which you become the MP and work through a range of activities – debates, votes (for instance, should homework be illegal?), press conferences, messages, meetings – keeping both party and constituents happy. Successful 'MPs' may be promoted, and there is recorded advice available from real MPs to help you on your way. Palmer has already had enthusiastic response to the game from 11 to 17 year-olds, and feedback along the lines of "I never realised how many things MPs did."

Party politics may not be what gets every teenager fired up, but Harry Wilkinson, Director of Humanities and Citizenship at South Shields Community School in South Tyneside, believes that all young people can be inspired to make their voices heard, particularly if you focus on issues which matter to them. Discussion is an increasingly important part of education, he maintains, to prepare young people for wider society. "We have a skills-based curriculum now which recognises the ability to discuss, put opinions forward and consider different points of view, and this is linked to community cohesion and citizenship. With a very different job market ahead of them and more career changes, young people will need to be able to adapt to change and to state their point of view."

Discussion is a big part of all lessons at South Shields Community School, with some topics taught largely through discussion, but Wilkinson is well aware of the challenges it presents. "You can't just start a discussion cold, or you get one or two dominant students and everyone else shuts up. We often give students some practical work to do first – for instance, sorting 30 statements on cards into different categories – and that gives them more confidence to contribute to the discussion. It's about getting them to feel they can talk in front of other people and that it's ok to hold a view that's different. The feedback teachers give on what is said and how they deal with something that might be inappropriate is important."

Harry Wilkinson is also a specialist teacher across the North East for 'Giving Nation', a Citizenship Foundation programme which gets groups of young people to argue for and lead their own charitable projects, with £50 of funding, to make a difference to their local communities. South Shields' students, for instance, made a music CD (of the school choir and school band) and sold it locally, and they also set up a scheme for reading to the blind. "It's a good way to develop student drive, interest and debate," says Wilkinson. "The idea is to encourage students to be more active in society, including through debate and presenting information."

Don Rowe, Curriculum Development and Resources Director at the Citizenship Foundation, says research suggests that schools do not spend enough time on discussion and debate. "It's hard and it's challenging. According to the research, teachers tend to talk too much themselves in class discussion, for instance taking every other turn. As teachers, we need to learn to talk less and allow students to talk more. We need to learn some different techniques which support young people to talk to and with each other, rather than being constantly led by the teacher."

Successful discussions, Rowe says, allow students to draw on some of their own experience, and this results in "a higher quality of thinking". He also recommends discussions which are exploratory rather than always adversarial. "If you're just trying to win the argument, certain things get left out. It's really helpful to have discussions which unpack the issues; it's real progress, in my view, if students see a subject as more rather than less complicated by the end of a discussion."

Maths and science may not appear to lend themselves to debate and discussion as readily as humanities subjects. But Jon Bunce, Head of Maths and Assistant Head at Park Community School near Portsmouth, is adamant that being able to talk about maths is increasingly necessary. "There is so much in-depth knowledge now that it is impossible for one person to know it all. That means if you want to come up with a new computer system, or a new algorithm for web pages, you need to be able to get your ideas across in such a way that they're going to be understood. You have to have a common language – and students have to learn that common language so they can talk about things."

"IT'S ABOUT GETTING THEM TO FEEL THEY CAN TALK IN FRONT OF OTHER PEOPLE AND THAT IT'S OK TO HOLD A VIEW THAT'S DIFFERENT"

All images - South Shields Community School

This language is, at first, 'alien' to Bunce's pupils, but he remedies this by building it into the structure of every lesson, explaining key words up front rather than avoiding them - for example by using "the coefficient of the variable" rather than "the number in front of the x term". When he gives students a problem to solve, he also encourages group discussion afterwards about which approach was the most efficient, getting them to consider each other's views. "It does open their eyes, because they always think maths is about right and wrong."

Closer to home for today's teenagers are activities stimulating discussion which involve social networking sites such as Facebook. In 2008 Channel 4 launched its first series of 'Battlefront' programmes in which, over the course of a year, it followed five young people campaigning on issues which mattered to them, including gun and knife crime, smoking in cars, and the pressure to be super-slim. The campaigners wrote blogs, posted videos on websites, and discussed and argued over campaign issues online with their peers.

A further series followed and the resultant ten programmes, available on the web, are already being used as models by students taking creative and media diplomas. The Battlefront website is being relaunched over the summer of 2010 so that young people can use it as a base from which to run their own campaigns. "It's teaching teenagers how you can use social media platforms (such as Facebook, Bebo, Twitter and YouTube) to reach people in different ways," says Matt Locke, Commissioning Editor of Battlefront at Channel 4. "It's inspiring to see your peers using social media to make a difference in the world."

Donna Hay, an ICT teacher at Sir Bernard Lovell School, near Bristol, is committed to using social media in school to help foster discussion skills, as well as to develop digital literacy. She uses EdModo (similar to Facebook), for instance, to pose questions on topics her students are exploring, and students then comment and discuss with each other online as well as in class. "The reason we are using social media is to get everybody to give an opinion," she says. "In a class discussion, there are always some people who contribute and some who don't. This way, everybody comments, and everybody can see everybody else's comments."

Power League is a free online tool, developed at Futurelab, which can be used to stimulate debate across the curriculum. In answer to an overall question posed (you can use a 'pre-set' subject or generate your own), students vote online to choose between two competing people, ideas or things – for instance who has more power and influence, or which is the bigger cause of global warming. Repeated votes create an online 'league', ranking people, ideas etc in order, and this then provides an interesting starting point for a class discussion.

Also available online is Futurelab's Exploratree, which contains a series of visual aids designed to help students look at a question from different perspectives and structure their thinking to encourage debate. This free resource was developed out of the Enquiring Minds project, which takes students' own interests as a starting point for learning and makes discussion - guided but not led by the teacher - a central activity. "Allowing debate in the classroom involves slowing things down, to give time for picking apart the points that are discussed," says Sarah Payton, a researcher at Futurelab. "One of the findings of Enquiring Minds was students saying they'd discovered that learning doesn't have to be about writing something down. They realised they could learn through debate and discussion."

As we move ahead in this new century, the art of talking, discussing, expressing and considering opinions – whether live in the classroom or as part of an online community - should have an important place in our schools. Doing this effectively means slowing the pace, fostering discussion, and then stepping back to allow the voices of young people to be heard on the things that matter to them.

Websites:

Channel 4's Battlefront - **www.battlefront.co.uk**

Enquiring Minds - **www.enquiringminds.org.uk**

Exploratree - **www.exploratree.org.uk**

Giving Nation - **www.g-nation.co.uk**

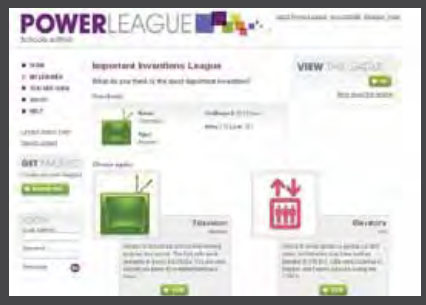
Parliament Education Service - **www.parliament.uk/education**

Power League - **www.powerleague.org.uk**

Battlefront

Enquiring Minds

Exploratree



Power League

CHILD'S PLAY

"Educational needs of young people in the UK are changing. Children don't come to school from a vacuum; they come to school from a cultural framework that schools need to embrace and accept," observes Derek Robertson, National Adviser for Emerging Technologies and Learning at Learning and Teaching Scotland (LTS). VISION talks to Robertson, the driver behind LTS's push to bring the technology that today's young people take for granted – Nintendo DS, Sony PlayStation, Nintendo Wii, and the rest – into the classroom to find out why...

"Games don't patronise children," says Robertson. "Games offer differentiation, continuity and challenge. We can use the best of them to make school a place where children want to be and where they can fulfil their potential," he says.

Robertson's cutting-edge vision for Scottish schools was way ahead of the times in 2006, when LTS realised there was potential for games-based learning in the classroom, found Robertson, and gave him free rein to move forward in the way he saw fit. "You have to give LTS credit for the chance it took on this," notes Robertson. "In Scotland, we are using gaming technology in every one of our 32 local authorities today. LTS took a chance on gaming, and it has paid dividends."

Robertson first stumbled onto the idea of commercial games-based learning as a teacher in Dundee. During this period, he saw two boys with low mathematical ability working on a complex problem-solving game on a Super Nintendo console. He was impressed at how the boys focused on the problem, accepted the challenge and worked out their own strategies to solve the problem in order to win the game. He noted that the boys were not working in a traditional maths environment, and realised that they would not have engaged in the same way had they been given a similar problem in a normal classroom setting. This led to Robertson's obsession with the idea of games-based learning as a way to get students of all abilities to engage with learning.

Robertson was a lecturer at the University of Dundee when he took the job at LTS to lead its games-based learning initiatives, which he has led through his Scottish Centre for Games and Learning, the Consolarium. His job at the university allowed him to establish games-based learning as a topic of study for his student teachers which meant that, while games were not new to him, he understood he would have to win hearts and minds among the educators of Scotland in his new role at LTS.

The main challenge that Robertson faced when he began his mission was convincing teachers and ICT managers that this was a sensible area to invest in. "In 2006, some of the people that make decisions on investment for schools thought this wasn't something they should invest in. But now, many of those initial doubters use gaming in the classroom themselves," he remarks. "From 2006 we quickly gathered momentum, as people saw the impact we were having in the classroom. Today, teachers don't need to be convinced of the value of gaming in the classroom. It is now grounded in practice."

Robertson says that the feedback his team gets from educators is always positive. "Teachers tell us, across the board, that once they begin using gaming in the classroom, there is an increased focus on self-improvement and self-determination; that engagement in writing and maths is increased; and students provide more imaginative responses to learning tasks."

"I think that in this society, you cannot afford to stand still," continues Robertson. "We need to look at all technologies with a critical eye to see how they can give the best opportunities to our learners. The most appropriately chosen games provide rich opportunities to teach," he claims. "Teachers with imagination can use these games to take children forward in education in a willing fashion."

Technology such as mobile phones and commercial gaming systems are commonplace in students' lives, from primary school upwards. This is a fact that Robertson has taken advantage of. He does not focus on gaming software developed specifically for education as he believes that much of this is below par and unable to properly engage students. Instead, he prefers to utilise the games that students play all the time, get excited about, and talk about with their friends. It is this technology that holds the key to learning for the future, he says.

"For too long, children have tolerated edutainment, which lacks subtlety in how it delivers education. Many educational 'games' are something dressed up as a game. But with PlayStation games, children will learn night and day. Once you cut through the fact that it's a game, you can see the learning opportunities," enthuses Robertson.

The key to unlocking students' engagement and focus in the classroom is to use games that suspend disbelief, claims Robertson.

As a teacher, I believe that children work well if you can suspend their disbelief. If we can teach in a context where they can use their imagination, they learn. The world of rock is popular now, so I thought we could use the PlayStation 2 game, Guitar Hero, with older primary-aged students. At that age, children are defining themselves, working out how to be cool, and are not yet at the stage where they would be embarrassed to sing and play in front of their classmates."

Based on similar technology to a dance mat, Guitar Hero players must attempt to play a guitar in order to perform in a series of rock venues. This has been one of the most successful games in recent times and is one that always proves popular with visitors to the Consolarium, says Robertson. The challenge presented by the game, the richness of the context that the game play is embedded within, and the sheer popularity of the game were reasons enough to merit exploration and to find out if, and how, this game could engage and motivate learners in school.

"We now run Rock Hero Day with schools to help P7 students transition up to S1, have won the 2009 European Microsoft Teaching Award at the Microsoft European Innovative Teachers Network in Vienna for our initial work with Musselburgh Grammar School on the project, and have just commissioned the University of Dundee to do research into the Guitar Hero transition project," he explains.

Another similar transition project run by Robertson is with children from nursery school into P1 and P2 using Sony EyePet, an augmented reality application that requires the child to keep their pet alive and happy. "The teacher will be able to use this project for a whole range of teaching," says Robertson.

"We are also using Nintendo DS game, Nintendogs, in a similar way. Nintendogs has been a wonderful find. Children suspend their disbelief and believe in a world of dogs; it engages them completely, and it's one of the best educational applications I've seen in the last ten years, and it's not even built for education." Robertson says in Nintendogs, the learning opportunities are numerous. Students are placed in a nurturing environment where they have to look after a creature, feeding it, exercising it, training it, earning money so they can afford to feed it, dress it and enter competitions.

"They learn to budget, as they can sell, buy and trade in the game. Young students learn about dealing with numbers in their thousands, whereas in the curriculum they are only expected to learn up to 100. There are many ways that the curriculum can be tied to this game: we've had teachers get dog wardens into school to teach students safety around dogs and how to care for them; students have written doggy diaries; and there have been written and maths projects. The game itself is just so engaging. The dialogue it creates and the opportunities it provides are just phenomenal," Robertson observes.

"Technology is at the heart of everything today," he concludes. "It is part of all children's everyday experience, from pressing the red button on the TV remote to watching a recording they've made of CBeebies, to downloading a video to the web from their mobile phones, and going online to see something mentioned on the back of a cereal box. It needs to be exploited to maximise the educational opportunities as, if we don't, children will think something's wrong with schools.

Games for learning resources

Futurelab has undertaken much research into how computer games might be used to support learning, resulting in a number of FREE online reports for both educators and policymakers. For further information go to:

www.futurelab.org.uk/projects/games-and-learning

www.futurelab.org.uk/projects/teaching-with-games

In particular, the following resources may be of interest to teachers and education practitioners:

Handbook

This handbook explores the state of play regarding the use of computer games to support learning. To download it FREE of charge, go to:

www.futurelab.org.uk/games

FREE poster

This full-colour poster illustrates some of the ways in which computer games can support young people's learning in school. To view online or request a printed copy, go to:

www.futurelab.org.uk/resources/publications-reports-articles/posters

Digital music: the waves of change

It was end of term when teachers at All Hallows Catholic School in Preston introduced their students to two songs for a forthcoming school production of Les Miserables. They wanted to sow the seeds early but were resigned to repeating the lesson after the holiday had dimmed memories. But they were astonished, at the start of the new term, to find that their students knew the whole show.

That's the power of YouTube. "They found that the children had learnt the whole show just by listening to YouTube clips of Les Miserables," explains music consultant David Ashworth. "The teachers were wrong-footed by that. Students can learn almost everything they want to learn about music from YouTube."

The very elements of social networking that so many schools are most anxious about – YouTube and Facebook in particular – are proving invaluable resources for learning, both in and out of schools. And music is one of the subjects best placed to take advantage of them. But it's much more than that...

It is as if there has been a digital 'big bang' for learning and teaching music. Within a short number of years, this explosion has brought services like MySpace, YouTube, Facebook, Twitter, iTunes, Spotify and Blip.fm - and new ones by the week - along with computer gaming and a huge range

of affordable digital devices like mobile phones, video cameras and MP3 players for recording and sharing. A range of materials and tools is now out there on the web, leaving teachers to concentrate on the pedagogy and learning.

social networking sites - in developing the groundbreaking Teaching Music website to bring social networking to teachers, offering an online community that supports continuing professional development (CPD). As its project leader, Ashworth identifies

step, showing you how to play the licks and riffs as well."

He continues: "We have just done a large-scale performance of Sergeant Pepper's Lonely Hearts Club Band, which is a hugely

"STUDENTS CAN LEARN ALMOST EVERYTHING THEY WANT TO LEARN ABOUT MUSIC FROM YOUTUBE"

Ashworth has enjoyed a unique position to witness and take part in huge changes in music education over recent years. He worked closely with NAME (the National Association of Music Educators) when it first took advantage of government support for subject associations to use technology in education. NAME probably took that initiative further than any other UK subject organisation with its work with Synergy TV – creator of the Radiowaves and NUMU

the influence of YouTube as massive. "Some teachers have twigged on to this now," he explains. "You don't have to teach kids everything; you can point them to the right YouTube clips. And it's not just the performance clips that are useful; there are so many tuition clips now. A guitarist who wants to learn a Beatles song will find two sorts of clips: one is archive footage of the Beatles playing it, and then they'll find some guitar tutor in slow-motion, step-by-

ambitious undertaking. But you know it wasn't difficult at all because the students just went on YouTube and learnt the stuff themselves. And all we did was help bring it together and sort out the arrangements and the performance. It was amazing, and with relatively little work to do. It was the power of the internet that did it all for us. And teachers are latching on to that because it can take a huge burden off their shoulders in terms of kids personalising

their own learning." (Some schools are now building their own 'how to' collections, like Forest Hill, in Lewisham, London - music.foresthill.lewisham.sch.uk/MusicBank/MusicBank.html.)

Musical Futures - the initiative for 11 to 18 year-olds started by the Paul Hamlyn Foundation in 2003 – has also had an important part to play in supporting this cultural change in UK schools. This project has effectively switched the priority to young people playing music and learning through doing. For example, innovative use of the online Gigajam music service and digital instruments allowed the Head of Music at Tiverton High School, Ian Wright, to enable every single Key Stage 3 student to learn music; a huge achievement.

Ashworth believes that Musical Futures has reached "critical mass", with the majority of secondary schools taking part. "The old approach was that you would have a two-tier system in a school," he explains. "You would have an elite who were having instrument lessons and playing in the orchestras and the bands, and the rest would be taking part in much more passive lessons. It means that when you get a whole class doing it – and of course standards vary widely – there's a lot of learning while you are doing. So the outputs aren't always impressive but the process is."

The evidence of these changes is there for all to see on the Teaching Music website, where teachers freely share their experiences and expertise. It's a welcoming, collaborative community that includes a significant slice of secondary teachers. But it is now making inroads among primary teachers who don't have the curriculum restrictions that their secondary colleagues face, but are likely to lack expertise and confidence. There is plenty of inspiration and it's freely shared. For example, if you want to know about using computer gaming for music, this site contains a forum thread on that subject and a range of others, from the everyday to the cutting-edge.

James Cross, a music teacher and e-learning coordinator at High Storrs School in Sheffield, uses Teaching Music to share a range of insights with colleagues. But he also posts videos to the site such as footage of a TeachMeet, the emerging wave of 'un-conferences' which focus on short presentations from teachers sharing their practice. He presented in Doncaster to show how teachers, confident with their pedagogy, can use a range of digital services and devices in their work.

"One of the key things for me is trying to close the gap between what students are doing outside of school and what we are able to offer them inside of school," he says. "A lot of children are learning to play instruments using services like YouTube

Top three images: Stuart Grills

James Cross

and we're trying to bring that into school and incorporate that kind of informal learning. We're definitely seeing a lot of that, particularly with children who haven't had proper lessons or who have had a few early on but they've quit and can't read notation. They are able to learn pieces visually through YouTube. A lot of them are doing it at home, particularly on the guitar."

His school is going through the government's Building Schools for the Future school rebuild programme and he, like David Ashworth, identifies school capital projects as having huge potential for changing practice and supporting work across the curriculum: a major challenge in secondary schools (High Storrs has already dispensed with old-style heads of department). He adds: "We are going to have a lot more computers in the classroom so we are looking at using video as a learning tool, maybe putting in a bank of videos that pupils can access at school."

Cross identifies Synergy TV's free NUMU online service - where young people can share their music and collaborate - as an important step forward. Music tracks are ranked by their listeners and this is proving popular among both students and teachers. The statistics are impressive, with 43,000 users, 1,300 member schools and 36,000 tracks. Cliff Manning, Communications Director at Radiowaves and NUMU, says that no one should underestimate the importance of Facebook going mainstream on our acceptance of using social software to support learning: "We have all, including teachers, become more open to social networking. I used to teach people about NUMU and ask whether they had a MySpace account. Maybe one or two teachers would put their hands up. Now, when I ask who has got a Facebook account, a forest of hands goes up. So now they understand the concept of sharing online and things like podcasting."

Manning continues in this vein: "That has created a shift in understanding so that when you talk about NUMU teachers think, 'Ah, this is like music and Facebook for schools', something they can get on with and use. And with Teaching Music they understand that this is a music area where they can share resources, and they can connect with other practitioners. They can discuss their work, the latest music education topic, and the latest music ICT. The web is not seen as technology so much now, so they are starting to see the benefits of using the web for publishing their work to a global audience, peer reviewing their work, reviewing their work through blogs, and being able to connect with other teachers to find out what they are thinking and to discuss the latest things."

"When we started out with Radiowaves, young people were excited that they could post their work online because they knew it was going to a global audience. Now we have created a level playing field for them with NUMU."

"THERE'S A LOT OF LEARNING WHILE YOU ARE DOING. SO THE OUTPUTS AREN'T ALWAYS IMPRESSIVE BUT THE PROCESS IS"

So the digital music 'big bang' has been and gone and, as the ramifications spread across the education galaxy, teachers are the ones who have to come to terms with the new landscape. It may be daunting but teachers like James Cross and his collaborators on Teaching Music, Twitter and other such digital resources are confident: "When you think of music technology you think of keyboards and sequencing and alike, but it's gone far beyond that now because music is online in the real world and it needs to be online in the music classroom too. Music technology now isn't just about keyboards; it's about getting online and sharing. It's all out there for students to access. They just need to learn that it's out there and that the teacher is not the fount of knowledge anymore; the teacher is there to connect and facilitate rather than impart information."

Stuart Grills

Links

BLIP.fm - **blip.fm**

Gigajam music service - **www.gigajam.com**

Learning and Teaching Scotland's Derek Robertson's Samba de Amigo and Wii Music in class - **bit.ly/9ShGEQ** and **bit.ly/75Fem0**

Musical Futures - **www.musicalfutures.org**

National Association of Music Educators - **www.name.org.uk**

NUMU - **www.numu.org.uk**

Spotify - **www.spotify.com/uk**

Synergy TV – **synergy.tv**

Teaching Music - **www.teachingmusic.org.uk**

YouTube - **www.youtube.com**

FREE resource for young people

Infocow is a FREE online resource that is made for, and managed by, young people aged 14-19. It links to sites, stories, information and inspiration on topics as varied as 'I want to do more with my music' and 'I want to change something about the world'. Infocow also offers specific information about rights and entitlements to help young people get what they want out of life.

www.infocow.org.uk

THE GREAT OUTDOORS

Iain Slade, Stiltskin Creative Arts Theatre Co and Lipson Vale Primary School, Plymouth

"We look for opportunities to go outside for learning," says Heather Gray, Deputy Headteacher of Echline Primary School in South Queensferry, just outside Edinburgh. Typical outdoor activities include: making an Anderson bomb shelter; tending the garden; painting pebbles; and dressing up in different coloured bibs to demonstrate the size and distance of the different planets. Cold weather holds no fear for the children; in the cold spell of 2010, they held a mini-Winter Olympics, with sledging, sliding and curling competitions (using bottles of frozen water for the curling stones).

Echline is not typical, however. As Alastair Seaman, a programme manager for the charity Learning Through Landscapes (LTL) points out, about 80% of school space is outside, yet children spend most of their time in the 20% of space that is, in Seaman's words "often stuffy and confined, lacking space and inspiration." LTL works with schools to help them transform their outdoor spaces to make them fit for active learning, for engaging with nature, and for fun.

Increasingly, educators are realising that outdoor learning is an excellent complement to classroom learning, helping to make learning engaging, hands-on, active and experiential (to name just a few of the benefits). As such, schools are engaging organisations such as LTL, Learning Outside the Classroom, which offers resources to teachers to promote outside learning, and the Real Ideas Organisation (RIO) to help them find ways of taking education out of the classroom.

Beth Munro, a garden designer who is working with RIO, has undertaken a range of activities to help schools improve their outdoor areas, including helping children to design a nature reserve, to create a willow maze (the willow can be used for practical craft activities), and to make musical instruments using natural materials. As Claire Honey, a creative agent for RIO, says, "Children enjoy themselves so much more when they're outside rather than being stuck in a stuffy classroom. It lends itself so

much better to inspiration and exploration; from music to science, role-play and story-telling. The opportunities are endless."

But there is more to outdoor activity than simply encouraging children to re-engage with the natural world. Modern technology has added an extra dimension to the experience of learning outside, as many schools are starting to discover. Sensors, for example, can be tagged to artefacts outdoors and transmit video and audio information about that artefact, such as how an oak tree looked 100 years ago. Echline School has acquired a 'visualiser' – a live camera that plugs into a projector, enabling pupils to view o bjects on a screen, such as an interactive whiteboard. When the children learn about plants, they go outside, collect their own leaves and ferns, and can see them magnified on the visualiser. "It's fantastic," says Gray. "You can see the spores on the back of the ferns to any magnification you want, and everybody can see them at one time, so there's a discussion going on. If we're dissecting a lily, you can take a picture of the lily, pull the bits off, split them, and have the timeline of a lily with all the sections."

The visualiser is a relatively simple example of how technology can enrich the experience of learning outside, but schools are now combining the use of technology with the use of their outside spaces in increasingly sophisticated ways. The South East Grid for Learning's (SEGfL) Birdbox project involves schools using birdboxes that are fitted with webcams and displaying the live pictures on a website, enabling students (and others) to see what's happening in the nests. Teachers can then use the images to stimulate the children's imaginations; some schools ask the children to do drawings of the birds and share them on the website, while another school, which regularly has blue tits in its birdboxes, encourages children to write imaginative journals about what's happening to the family inside the birdbox.

Some Kent schools involved in the national Nature Watch programme have taken the project further, explains Chris Davison, Curriculum and Content Manager for SEGfL: "The schools have asked students to go out into their environment and record various breeds of birds that have been coming into their feeder stations. The children collect the data and put it into an interactive spreadsheet using online Web 2.0 tools. We get schools simultaneously to fill this information in, and the result pops up for everyone to share. With the spreadsheet, the young scientists can start doing analysis work, look at trends and exchange their findings."

The schools have also been put in touch with experts from the Royal Society for the Protection of Birds. Using the free FlashMeeting video-conferencing technology over the National Education Network, the children can interview the experts, who have also prepared blogs and short broadcasts to help the students understand topics such as bird migration and survival. The ability to collaborate over the web is a major part of the learning experience for these schools, because they are able to compare bird data collected in different locations. There is even a school in Africa collaborating in the Birdbox project by putting up photographs of African bird species on the shared website.

It's not just Kent schools that have discovered the benefits of international collaboration on outdoor learning. Iona Primary School, situated off the west coast of Scotland, has a weather station, and children take daily manual readings from the school grounds and use all the information to create spreadsheets and graphs and monitor changes through

"Educators are realising that outdoor learning is an excellent complement to classroom learning"

Iain Slade, Stiltskin Creative Arts Theatre Co and Lipson Vale Primary School, Plymouth

Matthew Chilcott

Above and below: Learning through Landscapes

the seasons, sending the data to the Meteorological Society. Having made contact with schools in several other countries, they now share their weather information with schools in places as far afield as New Zealand and Australia, enabling them to learn more about differences in weather and the impact of climate change.

Many technologies mentioned so far have been around for several years, but some schools and community organisations are using newer technologies such as GPS, now integrated into many mobile phones, to engage with their local landscape. At Eastbury Comprehensive School in Barking, that meant addressing the issue of litter in the school grounds.

"Students used Google Earth and GPS to map the boundary of the school, to map the features and the litter hotspots," says LTL's Seaman. "They then took photographs of these hotspots and linked them using Google Maps onto a specific part of the map, so you can do a tour of the map, click on an icon and up comes a photograph of the litter spot with a couple of comments. Then the children went out with video cameras and recorded short cameo interviews with pupils about how they felt about particular areas and waste issues. Then they tied all this together into a presentation that they took to their management team about waste and the impact it has on them, and what they would like to see happening, and the management team took it on board and made those changes." As Seaman points out, the children learnt a variety of skills including using digital photography, filming, using mapping technology, negotiating and lobbying. These skills enable children to become digital creators themselves, developing content that other children can use outdoors.

Outdoor learning doesn't have to be confined to the school grounds, of course. Visitors to the Roman fortress, amphitheatre and baths at Caerleon in South Wales, can now use their mobile phones to access a learning trail, designed as part of the People's Collection of Wales, a Welsh Assembly project to make digital media available to the public. Visitors (both tourists and schoolchildren) to Caerleon are given a leaflet listing 18 different locations. When they visit each location, they can use their smartphones to see video content that relates the history of the location. Matthew Chilcott, Development Director for the Newport School of Education's Institute of Digital Learning, has been involved in the development of the trails and believes they will prove particularly valuable to schools, who are regular visitors to the site: "Through the use of the video 'shorts' we've been able to get a new interpretive narrative available - a type of location-based learning that previously didn't exist in the area."

The variety of opportunities for integrating technology with outdoor learning is vast, and offers children not just the opportunity to engage with the outdoors, but to learn in ways that were unavailable to previous generations. SEGfL's Davison says the effect on children's learning of projects such as Nature Watch has been transformative: "In the old days, you might have struggled to get a bit of written work out of a young lad; now they're doing all the creative work, all the thinking about what they're going to say, their research, checking their results, and coming with the confidence to share this with other people. The learning becomes unstoppable and they don't realise that this is learning."

Iain Slade, Stiltskin Creative Arts Theatre Co and Lipson Vale Primary School, Plymouth

Links

The Birdbox project - **birdbox.segfl.org.uk**

Caerleon Roman trail - **idl.newport.ac.uk/dev/roman-caerleon-sl.htm**

Eastbury Comprehensive School - **www.eastbury.bardaglea.org.uk**

Echline Primary School - **www.echline.ik.org**

FlashMeeting videoconferencing technology - **flashmeeting.e2bn.net**

Iona Primary School - **www.iona.argyll-bute.sch.uk**

Learning Outside the Classroom - **www.lotc.org.uk**

Learning Through Landscapes - **www.ltl.org.uk**

Real Ideas Organisation - **realideas.org**

South East Grid for Learning - **www.segfl.org.uk**

FREE handbook to support the design of outdoor spaces

This online Futurelab publication focuses on the use and utility of outdoor space for play and learning, and aims to support those thinking about redesigning their outdoor spaces as part of the Primary Capital Programme or other initiatives.

To download it, go to **www.futurelab.org.uk/outdoorlearningspaces**.

How am I doing, Mr Computer?

Technology-supported assessment

There can be few who would not agree with the government's assertion that "technology can improve teaching, learning, motivation, engagement and achievement".*

With creative software producers like Immersive and Soda among others, there are plenty of exciting and innovative products on the market to enhance learning in a variety of stimulating ways. In addition to 'bought-in' software programs, Web 2.0 applications offer a plethora of dynamic tools which can be used to great effect to enliven and inspire both classroom and home-based activities; and assessment needs to keep pace. As such, wikis, blogs, social networking, RSS feeds, forums, games, quizzes, worksheets and other types of assessment modules implemented within virtual learning environments like Moodle and RM's Kaleidos are increasingly part of many students' digital experience.

Technology-enhanced assessment has a pivotal role to play in a 'technology-confident' educational system which, just as it tailors educational opportunities to fit

individual needs (personalised learning), can also offer opportunities to assess work in ways that are flexible and that better meet the changing needs of both teachers and learners (personalised assessment).

There are strong arguments for using technology-supported assessment throughout the 'learning journey' - not least the fact that teachers can create and sustain an on-going dialogue with their pupils using the appropriate tools. Technology allows them to support their pupils more effectively as well as allowing young people to evaluate their own progress and that of their peers more closely. Online assessment can be administered and marked quickly and effortlessly; learners can be assigned automatically to appropriate tasks dependent on their results; teachers can observe progress; and pupils can work collaboratively.

It sounds ideal and like a fail-safe formula for raising attainment, engagement and standards all round. But is our education system 'e-mature' enough to integrate assessment into everyday learning using the available technology? Recent research by Becta (Messages from the evidence: Assessment using technology Spring 2010) would suggest otherwise and shows that a majority of teachers (60%) rarely or never use technology to create or administer tests. This is attributed to a lack of awareness, both about the benefits it offers and the potential uses of the 'technology-enabled' information that it imparts, such as tracking students' progress and their strengths and weaknesses.

For many, the introduction of e-portfolios is a cornerstone of technology-supported assessment - a personalised, online learning space that is 'owned' by the learner as well as a forum for teacher interaction with students in 'real time'. Although e-portfolios have yet to become a widespread feature of the education system and will benefit learning most effectively when they are introduced as part of a joined-up approach to teaching and learning - rather than as a discrete entity - there are some encouraging examples of their successful application.

Welsh students of 14 years upwards are well acquainted with the use of e-portfolios by Careers Wales to enhance students' self-awareness and career aspirations. The online service has been rolled out to all schools and colleges across the region and it can be accessed by users remotely at any time. In addition to assisting the user in gathering evidence about their learning and achievements, it supplies up-to-date careers information, interactive tutorials, support to write CVs, decision making and action planning wizards, and engages students with interactive exercises, games and quizzes.

At Coopers Technology College in Kent the development of 'My learning' areas for all students in all subject areas has made learners more independent and productive. Features include peer review, discussion boards, the use of a 'Cyberlab' for live discussions amongst small groups of learners and a quick response forum for Q&A. Assignments can easily be customised with discrete versions distributed to different groups, and learners appreciate the immediate feedback made possible by electronic assessment.

Online assessment lends itself particularly well to the evaluation of Personal Learning and Thinking Skills (PLTS) as outlined by the Qualifications and Curriculum Development Agency (QCDA) in the National Curriculum, and Cambridge Education's 'Personalisation by Pieces' is a web tool designed to evaluate learners' competencies in all key areas; be it creativity, team working or research skills. Learners are equipped with their own e-portfolio and can access a system of 'skills ladders' for each of QCDA's six skills groups as well as relevant exemplar work in each area. Participating pupils (currently totalling in excess of 8,000) then work their way through a series of progressively challenging objectives, managing their own targets and submitting their work from home or school. Assignments are automatically distributed to other schools for peer assessment by successful learners who have become 'experts' in that particular area. Such structured peer mentoring supports the process of self-reflection, and teachers guide learners by mentoring them and moderating assessments. It is easy to see how this kind of dialogue - both within a discrete peer group and between pupils and their teachers - might be a valuable learning experience in itself.

Of course, the quality and efficacy of technology-supported assessment depends

TECHNOLOGY-ENHANCED ASSESSMENT HAS A PIVOTAL ROLE TO PLAY IN A 'TECHNOLOGY-CONFIDENT' EDUCATIONAL SYSTEM

All images - David White, Clevedon School

largely on the ability of the humans who are administering it. A pilot project tracking the development of PLTS with Year 7 learners at Walton-le-Dale school in Lancashire reinforces this fact. They report that "the project is not about the technology, it is about the way in which students and staff use it. [The e-portfolio and learning platform] are excellent tools, but the key is to embed reflective self-assessment, and peer and teacher assessment of PLTS competencies into teaching and learning."**

Gareth Mills, Director of Compass Learning and formerly Head of Futures, Innovation and e-Learning at QCDA explains: "Teachers need to develop the skills needed to use the information that these systems generate to inform their medium- and short-term planning." Mills is swift to point out the richness that technology can bring both to the creation and gathering of 'evidence', and to the assessment process: "Young people are already engaging with an ever-widening range of digital media, capturing and presenting information in a variety of interesting and imaginative ways. If our assessment systems are not equipped to recognise and appreciate the advantages that these new tools can bring and the scope for expression that they offer, then both system and students are missing out."

The UK leads the field in educational technology with events such as the Technology World Forum and BETT, and we are pioneering in our approach. However, the benefits of our digital sophistication and knowledge are not yet being fully applied to enhance and deepen young people's experience of assessment. So, can technology be used to underpin a system of assessment administered by the awarding bodies at national level? One of the main obstacles preventing its adoption wholesale might be explained by the complexity and dynamic nature of the work that learners using those very technologies can produce.

Project e-scape has gone a long way in progressing our understanding of how this might occur. The brainchild of TERU (the Technology Education Research Unit at Goldsmiths College) and TAG Learning, e-scape focused on the development of classroom-administered assessment with GCSE product design students. Using handheld devices and multimedia e-portfolios via MAPS (Managed Assessment Portfolio System) learners not only capture the development of their designs in progress, but also record the thought processes underpinning their design decisions. This work is then checked by a remote moderator. The exercise assessed pupils' ability to create, prototype, evaluate and communicate a solution to a design challenge. Dave White, D&T subject coordinator at Clevedon School near Bristol is unreserved in his praise for the concept: "Do I see e-scape as an effective way of assessing creativity and innovation in design work? Without a doubt! It's time to think about new ways of gathering evidence, assessing what really matters in D&T and to move on. For me e-scape has done this."

Whilst e-scape may have employed the latest technology in new and exciting ways, the 'human factor' still has a big part to play. In fact, it was the job of specially trained markers to implement the 'Thurstone's graded pairs' approach employed to mark assignments by ranking students' work by comparing pairs of randomly sampled portfolios.

Indeed, to drive technology-enabled assessment down the path of automated marking (and the promise of an efficient, effective and potentially cost-effective 'fix') is reductive and rather misses the point. Technology has the potential to be a great enabler and offers us the ability to move away from mass, simultaneous, 'battery-testing' as well as away from standard-type tools and standard-type responses.

"Why should we adopt a 'one size fits all' approach when the available technology means that the assessment process can be tailored to individual need and preference? Learners progress at different rates and are ready to move on at different times. We should be able to respond to that requirement too," says Gareth Mills.

Assessment needs to be as dynamic as the technology which is being used to support learning. If used appropriately, technology-supported assessment could mean a better alignment between what is happening in our classrooms and what the awarding bodies accept and expect. As these inspiring pilot studies show, bolder and more engaging forms of assessment are already in the pipeline which are 'fit for purpose' for 21st century learners and learning.

*Taken from Harnessing Technology for Next Generation Learning: Children, schools and families implementation plan 2009-2012, Becta 2009

**Taken from Messages from the Evidence: Assessment using Technology, Becta 2010

New research on assessment

Futurelab has started a new research project, the aim of which is to explore how technologies can best support innovative assessment practices. Assessment is one of the main drivers in education with a huge influence on what is taught and how it is taught: and innovative approaches to assessment will both enable and create novel teaching approaches. In this new exciting project, Futurelab will engage with assessment experts to develop useful and realistic 'scenarios' that exemplify how new approaches to assessment can be implemented in practice. Outcomes from this research will be made available online so, for further information, go to **www.futurelab.org.uk/projects/assessment**.

Technology update

This section offers a round-up of some of the exciting technologies that could make the leap from innovative novelties for pioneers to cornerstones of modern life for the masses. Could these technologies revolutionise our everyday lives? You decide...

Staying safe online


National University of Singapore

The National University of Singapore has developed Petimos, interactive 'social robots' that have been designed to help protect children when they make friends online. Due to be launched in late 2010, they are aimed at 7 to 10 year-olds and work by notifying parents each time a friend request is made (parents can then block approaches that concern them). While the devices will initially only be used with the social network Petimo-World, the developers hope that they will eventually be used to provide safer access to other sites such as Facebook and MySpace.

www.mixedreality.nus.edu.sg/cutecenter/images/news/petimo/89-cheok-demo_idc_demo_paper.pdf

Going places


Microsoft Research

Microsoft's Mobile Surface is a small portable computer that can transform any surface such as a coffee table or a piece of paper into a multi-touch interactive display. Using a computer, projector and camera, it projects an image onto a surface and detects movement in between the projector and the image which the computer then translates into actions. It could, for example, allow customers in a restaurant to scroll through the menu and interact with it, as well as make orders.

research.microsoft.com/en-us/projects/mobilesurface/

Picture perfect

Researchers at the University of California, San Diego in the USA have developed a new type of photo-editing software that knows what your family and friends look like, and so can improve blurry snaps of them to make them worth keeping. The system uses face recognition technology to compare faces in 'good' and 'bad' photographs, and so correct 'bad' photos. The ambient features (colour and light etc) are also copied from the model photo.

www.newscientist.com/article/mg20627595.200-facesaving-software-rescues-bad-snaps.html

Another dimension


Nintendo

Projected to be available by March 2011, Nintendo have announced a new version of the portable DS games console, the 3DS. As you'd expect from the name, it allows games to be enjoyed with 3D effects - but without the need for special glasses. It is reported that the 3DS will include two cameras (one backward-facing, one forward-facing) and will be compatible with both DS and DSi games.

www.youtube.com/watch?v=v_P4gyjf5tQ

Transforming transplants

Researchers at the University of British Columbia in Canada have developed a synthetic version of the super-elastic molecules that stop our muscles from overloading - and hope that they might be used to make artificial body parts for transplantation. They work by being 'springy' when stretched with moderate force, but they soak up energy and don't allow overstretching when subjected to greater forces.

www.chem.ubc.ca/faculty/hongbin/group/grouppage.htm

Private and confidential

A new communications technology has been designed by the University of New South Wales in Australia to ensure that messages are only read by their intended recipients. More accurately, only receivers in a very specific location can see the message and the system (which uses quantum communications) relies on verification from the intended recipient – making it very difficult to intercept messages.

www.cosmosmagazine.com/news/3432/banking-safer-quantum-communication

Want to stay abreast of new technologies? Education Eye is a FREE online resource from Futurelab that brings together hundreds of the top educational websites, blogs, forums and case studies and presents them in an intuitive, easy-to-use format. **www.educationeye.org.uk**

PHOTOGRAPHIC EVIDENCE

HOW DIGITAL PHOTOGRAPHY CAN SUPPORT LEARNING

With the advent of low-cost digital cameras and the inclusion of such technology on most mobile phones, the ability to take, use, develop and share digital photos is now commonplace in the everyday lives of students. David Cleland, amateur photographer and ICT coordinator at Wallace High School in Northern Ireland, talks to VISION about practical examples of using digital photography to support his students' learning.

Digital photography offers an easy, creative and exciting way to approach the curriculum. Not only can we use the practice of photography to support learning in a range of subjects, we can also use the scientific principles of photography to teach subjects such as mathematics and physics.

However, it is important to acknowledge the transferable skills offered through the study of digital photography. Having taught Moving Image Arts (MIA) for a number of years, I am amazed, for example, at the ICT skill required to work with the different file types and the various hardware and software involved.

At Wallace High we use photography across the curriculum. Although each activity can be broadly categorised under communication, creativity and science, the most successful activities have tended to straddle two or even three areas at once.

There are numerous opportunities to use photography in science. We all probably remember working with lenses and light when we were at school as, if considered from a scientific perspective, photography is really all about understanding how light works. But it can offer much more than that. Photography can help us to work with and understand focal length calculations, refraction and spectrums – and that's just to name a few topics on the National Curriculum.

An obvious example of how photography can be used in science is in the documentation of experiments. One of the most interesting projects employed in Key Stage 3 biology at Wallace High involved groups of children using photography to write up a practical experiment. Instead of making notes as they worked through the experiment, they used a low-cost digital camera to take still images. They then used Plasq's Comic Life application to storyboard the experiment and bring it to life for their teachers and peers – and, of course, themselves. Comic Life – which allows users to create print quality comic-style stories from their own photographs - has an intuitive user interface which reduces the need to learn how to use the software, allowing pupils to concentrate on being creative. It couldn't be easier; students just drag and drop images, and add in filters, titles and speech bubbles. With the ability to export the comic in a range of different formats, Comic Life is a popular application across the curriculum. In my opinion, it's one of the easiest (and fun) comic-making applications available. It isn't free but it is certainly affordable with some local authorities offering licenses (at Wallace High School we initially made the software available in our computer lab, but ended up buying a full site license after a year).

Another example of the successful use of photography in science came about when pupils were asked to research the topic of recycling and the environment. For homework, students were asked to submit an image and related fact electronically using a Stixy Board. Stixy was a Twitter discovery and can be used to great effect for photographic group work. Imagine a massive digital noticeboard where pupils can upload their photos, add text and move content around freely. Stixy is used across the curriculum to gather fact-finding research by pupils that the teacher can then review with the class on an interactive whiteboard.

The project was a success and the unit of work has now been updated so that pupils need to capture the image or video themselves but Neal McKnight, Head of Biology, who was involved in the exercise offers the following hint: "Phone cameras are easier to work with as the photo dimensions and file sizes are considerably smaller than photos from a large megapixel camera, this makes the collaboration and exhibiting of work much easier."

But it's not just science that can benefit from the use of photography. There are many elements of the curriculum that photography can support. For example, in maths you can learn about symmetry, shutter speed fractions, aperture and the area of a circle, exposure calculations and frame rate (when using moving images). The interest in digital media, digital video and photography couldn't be stronger, and its use in a subject like maths can only help to engage students.

And then there's the use of photography to support story-telling, which is a part of modern languages, English and a range of other subjects. A number of years ago I produced a small unit of work that

required pupils to tell a story using only six photographs; no captions and no speech bubbles, just six photos presented either using PowerPoint or Photo Story (useful tools in the classroom). In the case of PowerPoint – which has to be the most obvious solution to presenting work - we have deliberately tried to avoid using it as there is a feeling that pupils are almost tired of creating PowerPoint presentations. However, used correctly, it can have a place in the classroom. In some ways Photo Story is the new PowerPoint. The production of end-of-lesson PowerPoint presentations has been replaced with end-of-lesson Photo Story productions. But you can see why: it only requires eight photos and a voice-over, and Microsoft's Photo Story (or Apple's iMovie) offers a simple workflow for pupils to create their own photo slide presentation.

This story-telling project was used at different levels throughout the school to teach different skills. For example, a sixth-form MIA student created 'The Life of Jackson' about Michael Jackson's life and work while Key Stage 3 students were asked to use camera phones equipped with Bluetooth so that they would learn the ICT theory behind Bluetooth personal networks. These students had to send their images to a school computer and, on completion, the work was sent back to their phones so that it was shared with friends via Bluetooth. Incidentally, like many schools, we already had a policy on not using mobile devices in class, but this project forced us to revisit this decision (in my opinion, we should embrace personal technology in a positive manner).

Telling a story in only six photos is considerably more challenging than you would imagine, and it is very interesting to view the final result. In MIA (sixth form), we ask students to present their work to others so that they can engage in a dialogue about the work. There is a palpable excitement when the student audience sees the imagery and the visual clues put in the scene of each photo and is able to accurately identify the story being told.

At Wallace High, we also use photography to support learning about history. You only need to look briefly at books such as 'The Genius of Photography' (or any history text book, for that matter) to realise how important modern photo journalism is in the study of our past. Photographers such as George Rodger brought photographic evidence of the horrors experienced in the Bergen-Belsen concentration camp and the Normandy invasions to the eyes of the world. In fact some consider photography to offer the real evidence of the horrors of World War II. At our school, pupils not only study how to read a photograph, but how to produce their own historical archive of current events, using the school's digital cameras as part of this process. Although most students produce printable documents some students have asked

"IMAGINE A MASSIVE DIGITAL NOTICEBOARD WHERE PUPILS CAN UPLOAD THEIR PHOTOS, ADD TEXT AND MOVE CONTENT AROUND"

Extract of photo story by Matthew Good

Links

Comic Life - **www.plasq.com**

Stixy - **www.stixy.com**

Photo Story - **www.microsoft.com/windowsxp/using/digitalphotography/PhotoStory/default.mspx**

13 photos that changed the world - **www.neatorama.com/2007/01/02/13-photographs-that-changed-the-world**

David Cleland

to build simple websites of their work, demonstrating further cross-curricular skills. Probably the most obvious area of our GCSE curriculum to introduce photography into is journalism. From history through to modern-day events, we have relied on the photo to communicate much of life. In so many ways it is the photo that survives when the actual news story has long been lost. As well as using photography to study for a GCSE in journalism, students produce an in-school magazine featuring their own stories along with photos of school life that they have taken on low-cost cameras (many students carry their own memory cards for easy transfer of photos from school cameras after they have been captured).

Photography is an incredibly accessible art form and, if a student is ever going to create a brilliant piece of animation or video (as they would in the study of MIA), they have to understand the art of still photography. This is also true for art students where photography can be used to support the study of history of art through to modern-day photography techniques. As well as the creative benefits of studying photography as an art form, it can be put to good use as a communication tool. At Wallace High School, students of A-level MIA are asked to put together a 'production diary' documenting the film-making process, and nearly all use annotated photographs for this documentation.

And then there are less obvious subjects such as geography and ICT. As well as actively using our bank of video cameras, the geography department takes still cameras on their various field trips. Although the focus is primarily on moving-image evidence of peat bog discoveries, the additional still images are used in wall displays, online VLE (virtual learning environment) posts and interactive whiteboard resources. As far as learning about ICT is concerned, photography supports a multitude of hidden learning opportunities - from working with USB, Firewire and Bluetooth transfer through to file compression, storage issues and file types. It is my opinion that pupils learn more about data storage while working with multimedia files than they do being taught the theory in class.

So you can see that photography really does have a place in schools, right across the curriculum. At Wallace High we are hoping to take things a stage further by introducing cross-curricular learning with photography for Year 10 students, meaning that all departments will need to synchronise their schemes of work. This would mean, for example, that a maths lesson on shutter speed fractions would be followed by an art lesson on modern-day photography techniques using Photoshop – and this can only lead to further engaging our students in their learning.

In fact, the art of photography has grown so popular that we have started a photography club, the benefits of which were initially under-estimated. Two of the school's core values are 'opportunity' and 'community', and the photography club offers a group of photo enthusiasts the opportunity to contribute to the school community by way of photos for the school website and magazine, and they are frequently invited to local sporting fixtures and school events to contribute their creative photography skills. The next step for Wallace High is to investigate the possibility of offering a formal qualification through the Open University in photography that can be gained during extra-curricular time.

In summary, there is a multitude of educational applications of digital photography - all it takes is a little creative thinking. Better still, with the advent of camera phones, photography is an activity that is easily available to most students. So, next time you want your pupils to collect information or exhibit their work, perhaps the still image can act as a new motivator over creative writing.

Further resources

280slides

An exceptionally easy and usable alternative to PowerPoint - it offers all the presentation tools of PowerPoint, but also offers the ability to share and display your content online. Ideal for those who don't have the software at home, it can be used as an introduction to cloud computing.

www.280slides.com

Animoto

Animoto claims to be the end of slideshows. Using Cinematic Artificial Intelligence, it allows pupils to direct and edit their presentations using both photos and video clips. This web-based application is very easy to use and, although a professional version is available for high quality productions, the free version is perfectly adequate for classroom use.

animoto.com

Comicbrush

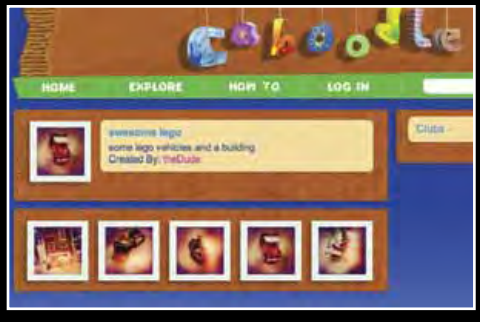
Comicbrush is a simplified online alternative to Comic Life. You can use your own photos and add digital assets using Comicbrush points (2500 points costs around $5, but there are plenty of art packs that are free to use).

www.comicbrush.com

Caboodle

This is the ultimate photo-sharing website for children. It is a safe online space for children between the ages of 7-13 to present photos of the things they care about most. To sign up, members need permission from a teacher, carer or parent and you only need five photos to create your first Caboodle.

www.caboodle.org.uk



Events

ITTE 2010

6-8 July 2010

Liverpool, UK

The Association for Information Technology in Teacher Education aims to promote the education and professional development of teachers in order to improve the quality of teaching and learning with ICT in all phases of education. As such, its annual conference offers an opportunity for the education community to network and remain up-to-date regarding the use of ICT in the classroom.

www.itte.org.uk/node/82

Building Learning Communities (BLC) 2010

11-16 July 2010

Boston, USA

The 2010 BLC conference is designed to have an immediate and long-range impact on improving teaching and learning. With representatives from around the world, the programme features hands-on pre-conference sessions, keynotes and a vast number of workshops.

novemberlearning.com/blc

SIGGRAPH

25-29 July 2010

Los Angeles, USA

This annual conference offers the opportunity to see, meet and interact with the 'People Behind the Pixels' – those who are creating the next wave of international excellence in computer graphics and interactive techniques. The event's website promises that SIGGRAPH 2010 will "showcase educational presentations that highlight unique learning practices and pedagogies, curricula and courses, and educational research projects".

www.siggraph.org/s2010

IAEA 2010

22-27 August 2010

Bangkok, Thailand

This conference invites participants to examine assessment policy, practice and innovations by considering its value, meaning, breath, depth and sustainability, asking "if assessment directs the future, where are we heading now?" Keynote speakers include Gordon Stobart, Emeritus Professor of Education at the Institute of Education in London and Professor of Education at the University of Bristol.

www.iaea2010.com

ALT-C 2010: "Into something rich and strange"- making sense of the sea-change

7-9 September 2010

Nottingham, UK

Learning technology is part of the fabric of formal and informal learning, but a sea-change is taking place. We are always connected; the devices we use are growing in capability and diversity; and the information environment and the tools and services that we use to navigate and to interact with it and with each other are in great flux. This poses a challenge for education which this event aims to support us in overcoming. Keynote speakers at the ALT-C 2010 conference include Barbara Wasson, Professor of Pedagogical Information Science at the Department of Information Science and Media Studies, University of Bergen, Norway; Sugata Mitra, Professor of Educational Technology at Newcastle University; and Donald Clark, board member of Ufi and former CEO of Epic Group plc. There will be a welcoming keynote from Saul Tendler, the University of Nottingham's Pro-Vice-Chancellor for Teaching and Learning, and Professor of Biophysical Chemistry.

www.alt.ac.uk/altc2010

Mobile HCI 2010

7-10 September 2010

Lisbon, Portugal

This 12th International Conference on Human-Computer Interaction with Mobile Devices and Services provides a forum for academics and practitioners to discuss the challenges and potential solutions for effective interaction using these technologies. It covers the design, evaluation and application of techniques and approaches for all mobile and wearable computing devices and services.

mobilehci2010.di.fc.ul.pt

The Scottish Learning Festival

22-23 September 2010

Glasgow, UK

The Scottish Learning Festival is all about teaching and learning, and offers a number of opportunities to enhance the education profession by providing: inspiration and new ideas; an opportunity to network with peers; and a range of options to enhance the learning and teaching experience for all. In addition, it promises the chance to obtain practical advice and ideas about the effective use of ICT in classrooms to improve the quality of learning and teaching.

www.ltscotland.org.uk/slf

TES Education 2010

1-2 October 2010

London, UK

At TES Education 2010, we are promised ideas, educational resources and inspiring CPD training for early years, primary and secondary educators. The event website says that this event is a great opportunity to see what's new, compare the latest resources and learn from the UK's leading experts at one of the CPD seminars available. Speakers include Vivienne Porritt, Executive Director at the London Centre for Leadership in Learning, Institute of Education who will be talking about 'Strategic leadership of professional development', and Dr Brian Male, CEO at the Curriculum Foundation who will be exploring 'A curriculum for the 21st century'.

www.teachingexhibitions.co.uk

Education and Educational Technology (EDU '10)

4-6 October 2010

Iwate, Japan

The conference on Education and Educational Technology (EDU '10) is organised by the World Scientific and Engineering Academy and Society (WSEAS). While its main focus is educational technologies, it also covers engineering technology. Plenary lectures include 'Teaching Digital Citizenship' which explores how educators might develop and deliver technology-based curriculum that addresses how learners can effectively and responsibly access, assess, use, share and produce digital information as well as contribute positively to the digital world.

www.wseas.us/conferences/2010/japan/edu

Handheld Learning

11–13 October 2010

London, UK

Now in its 6th year, the Handheld Learning Festival and Conference is renowned for bringing together an outstanding group of thought leaders, innovators and grass-roots practitioners from the education, technology and media sectors to network, debate and shape the future. It will feature three days of lively interactive debates, learner and practitioner showcases, inspirational talks from leading thinkers, special interest breakouts, networking and social sessions. Attracting nearly 2,000 delegates and attendees, this event has become a world-class forum and must-attend event for international education and industry leaders alike.

www.handheldlearning2010.com

mLearn 2010

19-22 October 2010

Valletta, Malta

This conference will appeal to a wide range of audiences who are interested in enhancing learning, designing content and developing systems for mobile devices and wireless networks. The main theme will concentrate around the future of mobile and contextual learning and increased accessibility for all users in terms of technologies, applications and further developments.

www.mlearn2010.org

ICT for Education Conference Programme 2010: The influence of ICT on behaviour

June - November 2010

UK

This five part series of one-day conferences asks if, with technology being such a key force behind the transformation of our educational landscape, are we at the stage where it is technology that is driving both the learning and behaviour agendas in schools?

www.ictforeducation.co.uk

Online Educa Berlin

1-3 December 2010

Berlin, Germany

The themes for this year's event include 'learning about learning' and 'learning content' as, on the website, we are reminded that "in the last century we were told that 'content is king' and, in the new millennium it remains a critical area of focus."

www.online-educa.com

BETT

12-15 January 2011

London, UK

It's the world's biggest educational technology show and attracts nearly 30,000 visitors every year – all the key UK ICT organisations, agencies and companies are there. Seminars from 2010 covered topics as varied as curriculum, school management and leadership, Building Schools for the Future and computer games in the classroom, and 2011 promises to offer a similar variety. Increasingly international and free to attend, you need to pre-register and pre-plan to make the most of this bustling event.

www.bettshow.com

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