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The Role of Technology Enhanced Learning and its Global Impact on the Higher Education Sector

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Structure of Presentation

- Digital Communications
  - Broadband for All?
  - Mobile, The Global Solution?
- What is Web 2.0
  - Collaboration, Communication, Content Creation
- Technology Enhanced Learning
  - A New Approach to Pedagogy?
- Where are we Now?
  - Where can we Expect to be in the Future?

Digital Communications Technologies

Broadband for All?

Fixed Network Access Technologies

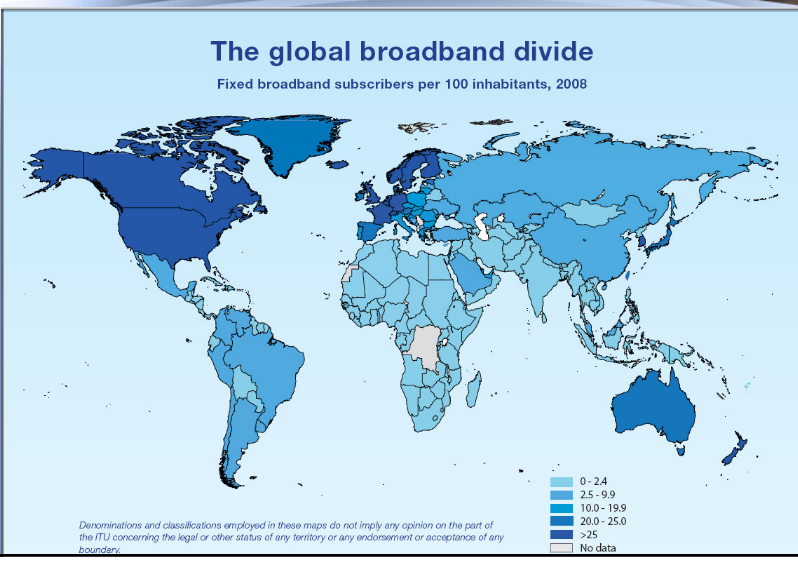
- There are a variety of means of gaining access to the Internet
- Dial-up Modems
  - Where it all began
  - Restricted to about 56 kbit/s
  - Gradually being replaced throughout the world
- Asymmetric Digital Subscriber Line through existing telephone copper wires
  - Can now deliver up to 8 Mbit/s in UK
  - ADSL 2+, next generation, offers speeds up to 24 Mbit/s
    - Gradually rolling out in UK
- Cable Access via broadband optic fibre networks

Broadband Fixed Networks – World Statistics for 2007 from the ITU

- Internet Access
  - An average of 1 in 5 People were online
    - Increased to 1 in 4 by 2009
  - 55.8% of developed World
  - 12.8% of developing World
- Penetration levels for people using the Internet varied from region to region
  - Europe 44%
  - USA 43%
  - Asia less than 15%
  - Africa less than 5%
- Broadband Connection
  - 60% of all Internet subscribers
  - Less than 0.2% penetration in Africa
  - Europe 14%
  - Americas 11%
  - Asia 3%
  - Oceania 17%
  - More than 500 million fixed broadband subscribers by end of 2009
- China largest broadband market since 2008, when it overtook USA
  - Penetration of 6.2 subscribers per 100 inhabitants

Source: Measuring the Information Society: The ICT Development Index, ITU 2009.

The Global Broadband Divide



Why is Europe so committed to investing in the Information Society?

- *"Each 10% extra of broadband penetration yields 1.3% extra growth, according to a new World Bank Study"*
- *"Roll out and development of high speed broadband internet – whether via fixed or via wireless connections – could create around one million jobs in Europe, and spur broadband-related growth in economic activity to the tune of €850 billion."*
  - *Vivienne Reading, European Commissioner for Telecommunications and Media, The Ludwig Erhard Lecture, Lisbon Council, Brussels, 9 July 2009.*
- Europe is currently under the 7th Framework Programme
  - Period spans 2007 to 2013
  - 9.1 €billion budget on ICT research and development
- In spite of the global recession, government organisations are continuing to invest in Information and Communication Technologies (ICTs)

UK Government Policy

- Policy outlined in the document
  - Digital Britain, Building Britain's Future
    - June 2009, Dept. of Business Innovation and Skills
  - *"To strengthen and modernise the country's communication infrastructure, equipping the UK to compete and lead in the Global Digital Economy"*
- *Estimates 89% of UK homes can access 2 Mbit/s or higher*
  - *2.75 million homes excluded*
- *UK Average data rate of 3.3 Mbit/s rising from 512 kbit/s in 2005*
- *Aims to achieve 2 Mbit/s connectivity to virtually every household in UK by 2012*
- *Virgin Media already offering 50 Mbit/s to at least 7 million homes*
- *UK government recognises the roll that next generation mobile can play in broadband service provision*

Other national policies

- Germany
  - Basic service of 1 Mbit/s to be rolled out by end 2010
  - 75% of households at 50 Mbit/s by 2014
- USA
  - Investing $7.2bn for broadband projects
  - Investing $2.5bn for its distance learning, telemedicine and rural broadband programmes
- Australia
  - 43$bn (£21bn) fibre to the home (FTTH) project to 90% of homes, with remainder connected wirelessly
  - 8-year time frame, starting with Tasmania

Source: Building Britain, Building Britain’s Future, June 2009, Dept. of Business Innovation and Skills

Where are we today, in terms of fixed network connectivity?

- Globally, now 1 in 4 of us are connected to the Internet
  - There are, however, clear disparities in the coverage, with Europe and America accounting for in the region of 2 in 5 connections
  - China represents the largest market despite a relatively modest penetration rate
  - Africa has very limited access
  - There is a clear differentiation between developed and developing economies
- The importance of broadband access to economic prosperity is emphasised by the significant strategic investment by Governments throughout the world
  - The emphasis is now on increasingly faster data rates that will open up the possibility for the delivery of new services and applications to the home

Digital Technologies

Mobile, The Global Solution?

Mobile Network Evolution: GSM

- 1991:
  - GSM, the pan-European Network, introduced mobile data at 9.6 kbit/s
- 1995:
  - GSM introduced the Short Messaging Service (SMS), allowing text messages of up to 160 characters
  - 7 billion SMS messages sent in UK in July 2009
- 1997:
  - GSM evolves to packet-oriented transmission with the introduction of GPRS
  - Data rates available up to 170 kbit/s
- 2001:
  - EDGE, a further evolution of GSM, takes packet-oriented transmission rate up to 384 kbit/s

Mobile Network Evolution: UMTS

- UMTS introduced in 2001
  - Enabled data rate transmissions up to 2 Mbit/s
  - Built on GPRS/GSM core network
  - Introduced new W-CDMA air interface
- First phase of UMTS evolution with:
  - Introduction of High Speed Downlink Packet Access in 2005
    - Increased data rate to 8 Mbit/s
  - Release of High Speed Uplink Packet Access in 2008
    - Allowed date rates of about 5 Mbit/s on uplink
- Second phase of UMTS evolution with introduction in 2008 of HSPA+
  - Allows data rates of about 50 Mbit/s
  - Currently available through 17 operators world-wide

Wireless Local Area Network – More than just Mobile

- Wireless LAN standard dominated by the 802.11x family, widely known as wi-fi
- Early standards, 802.11a and 802.11b, provided high data rates of 54 Mbit/s and 11 Mbit/s, respectively, in 'hot spot' areas
- Later releases of the 802.11g and most recently the 802.11n standards
  - Typical data rates up to 54 Mbit/s for 802.11g standard
  - 802.11n standard, released in September 2009, increases data rate to up to about 300 Mbit/s

Wireless Metropolitan Area Network - WiMAX

- WiMAX provides connectivity to large scale, metropolitan areas
  - Standardised under IEEE 802.16
- Point-to-Point Line-of-Sight range of 48 km
  - Theoretical throughput of 75 Mbit/s in both directions
- Point-to-Multipoint non-Line-of-Sight range of up to 8 km
  - Used for business or residential subscriber connection
  - Capable of providing last mile connectivity over the air at data rates of up to 10 Mbit/s
- Mobile standard developed in 2005
  - WiBRO, IEEE 802.16e, operational in South Korea
  - Possible replacement or at least competitor to 3G

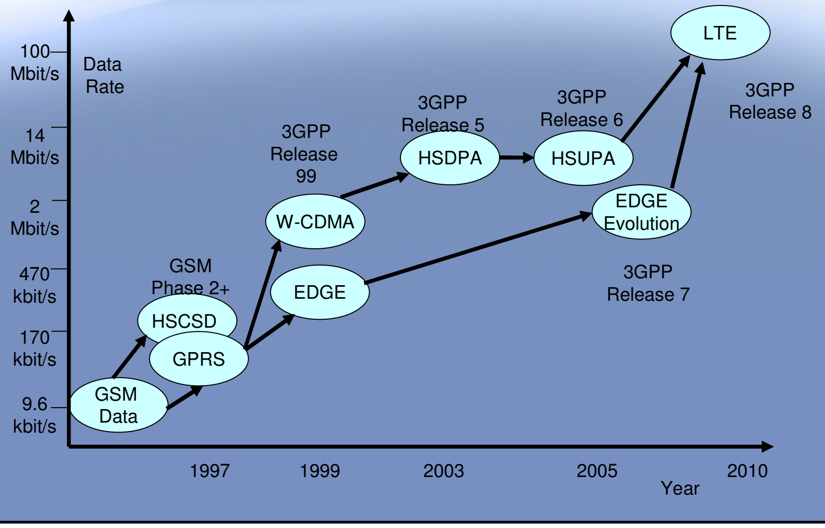
Satellite Communications

- Suitable for areas without terrestrial coverage
- Geostationary technology well-established
- Broadband services can be bundled together with Direct Video Broadcast Services

Mobile - Long Term Evolution (LTE)

- Builds on UMTS network architecture
  - 4th Generation Mobile
- Forward Link Data rates up to 300 Mbit/s
  - Return link up to 75 Mbit/s
- Broadband data rate achieved through the use of OFDM/MIMO technologies
- Will be specified with Release 8 of 3GPP Specifications
  - End of 2009/early 2010
- Based on all IP network configuration

Mobile Service Evolution



Mobile Broadband Take-up

- By end of 2008, there was close to 335 million mobile broadband subscribers according to ITU
- More than 170 million HSPA subscriptions according to UMTS Forum, Nov. 2009
- In developing countries, mobile broadband subscriptions are now greater than fixed network
- According to ITU statistics, by the end of 2007:
  - Mobile broadband penetration 14% in developed world
  - Less than 1% in developing world

Where are we today, in terms of mobile network connectivity?

- Mobile is gradually catching up with fixed network data rates
  - HSPA+ is comparable with ADSL
  - WiMAX also offers a viable alternative
- The introduction of LTE within the next two or three years is set to provide very high speed data access
- Mobile broadband is a viable alternative to fixed broadband solutions
  - Developing economies, in particular, are likely to benefit from the bandwidth available

What is Web 2.0?

Collaboration, Communication, Content Creation

The World Wide Web – In the Beginning

- The World Wide Web was invented by Sir Tim Berners-Lee in 1990
  - Defined the HyperText Transfer Protocol (http)
    - E.g. http://www.intimal.edu.my/icreate2009/
  - Together with the Uniform Resource Locator
- Allowed computers running web browser software to talk to each other on a client-server basis
- World Wide Web Consortium established in 1994 to oversee WWW development
- Web quickly expanded as more and more sites became available, in turn attracting more and more users
- Google, formed in 1998, addressed the demand for efficient search engines
  - Formed the basis for the 'Google' generation

Traditional Web Surfing

- Traditional web pages work in broadcast mode
  - Concept can be thought of in much the same way as TV broadcasters
- Owners, or servers of web sites produce media content, which is displayed on their web pages
- Readers, or clients digest material in a passive way
  - Communication of information is in one direction, from server to client

Web 2.0 – A New Approach

- A new concept widely attributed to O'Reilly in 2004
  - http://oreilly.com/web2/archive/what-is-web-20.html
- Still some debate about what Web 2.0 actually means but usually characterised by
  - On-line collaboration
  - Communication, often in real-time
  - Content creation
  - Group activity
  - Networking
- Removing the client-server relationship and making the Web no longer solely a broadcast medium

Social Networking – On-line Friends

- Social Networking is the most widely referred to of all the Web 2.0 facilities introduced over the past five years
- Facebook is now the UK market leader
  - Unique audience of 19 million
  - Myspace 5 million, Bebo 4 million
- These tools provide the opportunity to form friends and closed groups
  - Also to upload media, such as photographs, and share with others
- Individuals may decide to have professional and social accounts

Source: Ofcom The Communications Market 2009

Social Networking – This is what I'm Thinking

- Blogs are a means of publishing individual journals on-line
  - A major application is http://www.blogger.com
- Twitter is a micro-blogging tool that has rapidly grown its user base since its introduction in 2007
  - Similar in concept to the SMS in GSM
  - Characterised by regular updates based loosely on "What am I doing now?"
  - 2.6 million unique users in UK
  - 1679% increase over the period May 08 – May 09
- Twitter is now often used in the media as a mode of communication

Source: Ofcom The Communications Market 2009

Social Media – Look at me!

- These set of Web 2.0 programmes enable users to publish their own content on the web
- YouTube is a prime example of a Social Media Tool
  - Repository for storage of video clips on anything from personal reflection, music videos through to lectures
  - Established in 2005
  - Sold to Google for $1.65bn in 2006
- Flickr is an example of a facility used primarily for the storage of digital photographs
  - Established in 2004 and eventually sold to Yahoo
  - Innovator in the use of Word Clouds or Tag Clouds

Word Cloud of my Presentation Abstract

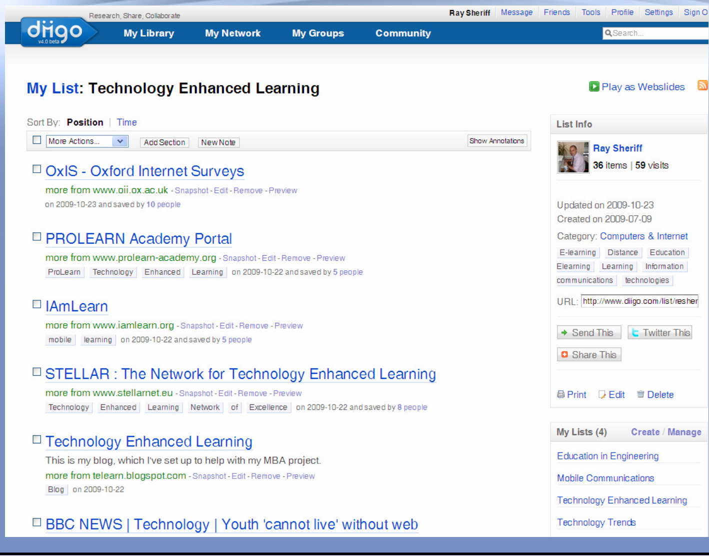
Collaborative Writing – We think, therefore we are!

- Wikis provide a means for groups of users to contribute to collective writing
  - Access is through a web browser using a simple mark-up language
- The biggest success of wikis is WikiPedia
- It is possible to retain control of user access and to track contributions to text
- Applications could include writing research proposals, laboratory reports or anything that can be written collectively
  - Ideally suited for group activity

Social Bookmarking – Let's Work Together

- Tools such as delicious or diigo provide a means for sharing web sites with the web community
  - Possible to view all bookmarked web sites of other users with common bookmarks
- Web sites can be stored and commented upon
  - Organised into lists
- Useful tools for research

My Diigo List Page



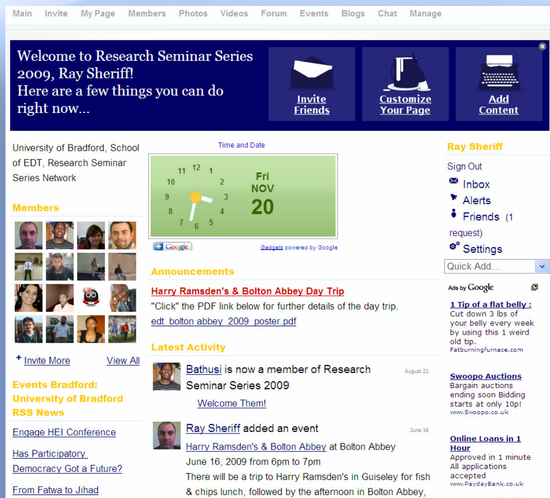
Immersive Technologies – Another Side of Me

- Allows users to take on different persona through the use of avatars
- Can interact with other users on the Internet in virtual world environments
  - On-line gaming is one example
- Second Life allows user-created avatars to roam around worlds created by individuals or organisations
  - 3D Multi User Virtual Environment (MUVE)
  - Interact with other visitors to the site
  - Virtual meetings, lectures or conferences
  - University open days

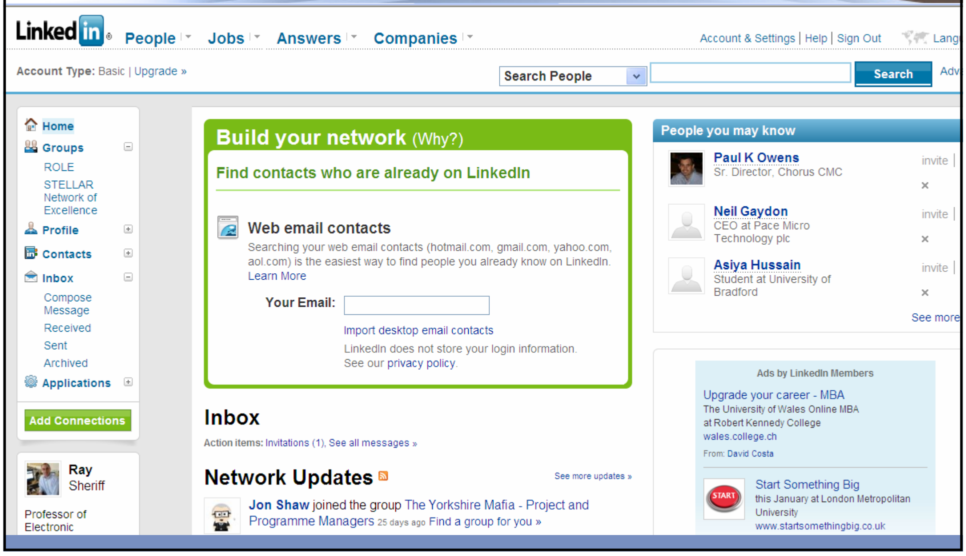
Other Popular Networking Tools

- Ning
  - Social networking site that allows closed user group communities
  - Currently employed at Bradford for MSc cohort
- LinkedIn
  - Professional network
  - Work based community for establishing a web of contacts
  - Includes Group facility

A Ning Network employed in Postgraduate Teaching at Bradford



My LinkedIn Network Page



Web 2.0 – Lots of Dimensions

- There are currently a large number of tools on the Web
- The emphasis is on Groups, Collaboration and Creativity
- They are very popular with young adults
- So,
  - How can these tools be harnessed for the purpose of education?

Technology Enhanced Learning

A New Approach to Pedagogy?

Digital Natives and Digital Immigrants

- Digital natives are considered to be those that have been brought up in the digital era
  - Born from 1990s onwards
  - Exposed on a daily basis to the use of digital technology, they are techno-savvy
  - Sometimes also called:
    - ‘Net Generation’
    - ‘Google Generation’
    - Generation ‘Y’ (born between 1976 and 2000)
- On the other hand, Digital immigrants are considered to be those that have had to adopt or embrace new technology

A Commissioner's View

http://www.youtube.com/watch?v=4yTF9-RabB4&

- *There is a whole generation of digital natives ready to apply innovative web 2.0 to business and public life as podcasters, bloggers, social networkers or website owners.*
  - *Vivienne Reading, European Commissioner for Telecommunications and Media, 9 July 2009*

Digital Divide within the Classroom?

- Some commentators argue that there exists a digital divide within the Classroom between:
- Digital natives
  - Students
- Digital immigrants
  - Teaching staff
- Prensky (2001) argues that teaching staff will need to change the way they teach in order to accommodate technology advances

Prensky, M. (2001). *Digital Natives, Digital Immigrants*, On the Horizon, Vol. 9 No. 5, Oct. 2001.

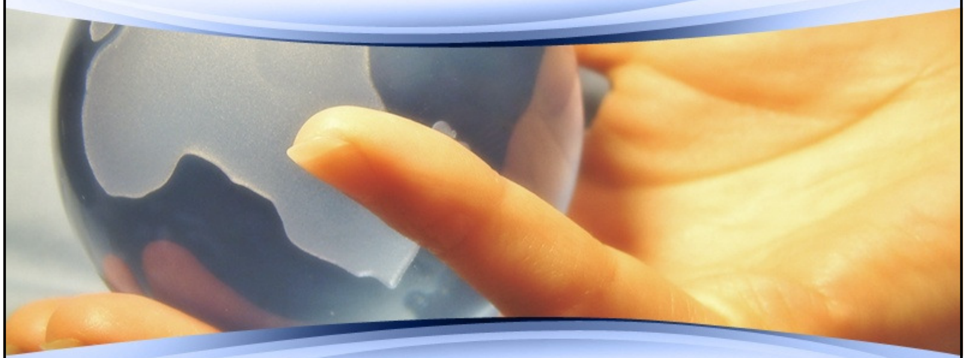
How is technology influencing pedagogy – if at all?

- The collaborative nature of web 2.0 tools can help bring geographically dispersed groups together
- Wikis can be used for collaborative coursework and group cohesion (Northumberland Colllege)
- Reflective blogging has been found to increase the ability of students to perform critical evaluation
  - Found to increase reticent student participation (Uni. Edinburgh)
  - Group blogging can help to identify individual difficulties
- Digital audio feedback on coursework found to be beneficial, especially for English 2nd language and dyslexic students (Leeds Met Uni)
- Video tutorials prepared for mobile devices and audio recordings for iPods proved popular with students (Southampton Solent Uni)

Source: Effective Practice in a Digital Age, JISC, 2009

Where are we now?

Where can we Expect to be in the Future?



Conclusion - Technology

- The World Wide Web has been with us now for nearly two decades
- Mobile Communications, the other great technological innovation of the latter part of the 20th century, is of a similar age
- Both technologies are now maturing and starting to deliver bandwidth capabilities that are opening up new opportunities
- There is still a digital divide
  - But the gap Is set to close with the roll-out of Mobile Broadband

Conclusion – Web 2.0

- The World Wide Web has enabled a global transformation of how we communicate and do business
- Web 2.0 tools and applications are now starting to be firmly rooted into the social culture
- Applications such as Facebook, YouTube and, most recently, Twitter are taking communication and collaboration to a new level that is global in dimension
- The take-up of Web 2.0 tools and the enrichment of content is likely to continue to gather pace, as broadband communications becomes more widely deployed throughout the world

Conclusion – Technology Enhanced Learning

- There is now significant interest in the role that technology can play in the provision of education
  - How will technology relate to pedagogy in the future?
- Students entering higher education are likely to become increasingly *au fait* with technology and its capabilities
  - Is there likely to be a digital divide with students driving the use of technology?
- Are University campuses likely to remain as they are or can we expect more and more programmes to go on-line?
  - Removing geographic boundaries and turning Institutions into truly international organisations

Looking Ahead

- The rapid growth in technology and the innovations in how this is employed have created opportunities as well as threats to the higher education sector
  - These can be viewed on a global scale, due to the influence of the World Wide Web
- The relationship between pedagogy and technology is likely to be central to educators thinking over the coming years
- Much research now needs to be done in order to understand the complicated picture that is emerging

Please get involved!

- If you are interested in sharing your experiences of technology in higher education, please visit my blog page and complete the appropriate on-line questionnaire

  http://telearn.blogspot.com
- Thank you