Teaching and learning with the Web: What we've learned, where we're headed

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YORK IRLT

Ten Years Ago

RESEARCH NEWS AND COMMENT

The World Wide Web: A Technology to Enhance Teaching and Learning?

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Nothing before has captured the imagination and interest of educators simultaneously around the globe more than the World Wide Web.[1] The Web is now causing educators, from preschool to graduate school, to re-

- Does it promote improved learning?
- Does it accomplish the above while containing, if not reducing, the per unit costs of education?

cal screen layout, interactive multimedia learning materials, simplified access to and searching of databases, exponential growth of new resources around the world, and open technical standards that allow any modern com-

March 1997 *Educational Researcher*

Questions I asked in the article about the Web

1. Can it increase *access* to learning?
2. Can it lead to improved *learning*?
3. Can it maintain or reduce *costs* for learning?

Before exploring the progress that has been made on these questions…

A Short History of the Web

Sir Tim Berners-Lee developed protocols in 1989 and launched first website at CERN in Switzerland in August 1991

His Vision…

- To develop a tool that would allow the laboratory "to much more efficiently use people who came and went, use student work, and use people working remotely."
- "An information space through which people can communicate…by sharing their knowledge in a pool"
- But the Web should not be "a big browsing medium," nor "a glorified television channel."

First website – Aug. 1991

World Wide Web
The WorldWideWeb (W3) is a wide-area hypermedia information retrieval initiative aiming to give universal access to a large universe of documents. Everything there is online about W3 is linked directly or indirectly to this document, including an executive summary of the project, Mailing lists , Policy , November's W3 news , Frequently Asked Questions .

What's out there?
Pointers to the world's online information, subjects , W3 servers, etc.

Help
on the browser you are using

Software Products
A list of W3 project components and their current state. (e.g. Line Mode ,X11 Viola , NeXTStep , Servers , Tools , Mail robot , Library)

Technical
Details of protocols, formats, program internals etc

Bibliography
Paper documentation on W3 and references.

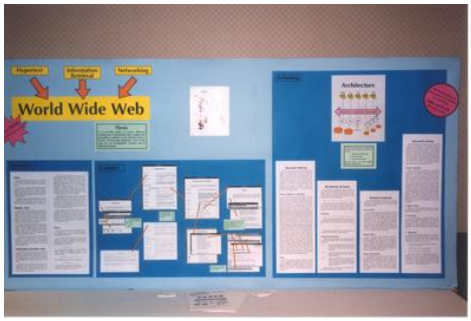
People
A list of some people involved in the project.

History
A summary of the history of the project.

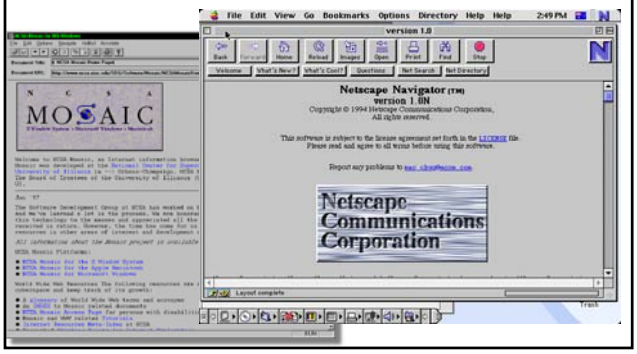
How can I help ?
If you would like to support the web..

Getting code
Getting the code by anonymous FTP , etc.

TBL's description of the web is relegated to a poster session



Mosaic (1993) and Netscape (1994) browsers propel the web

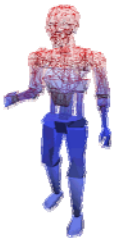


Twelve years after Netscape…

- China: 25 million students taking e-learning courses in universities
- USA: 3+ million taking online higher ed courses (1/5 higher ed pop'n). Growth rate is 20% annually compared to 1.5% for higher ed system
- UK: Open University 180,000 worldwide

And the rise of the Net Generation

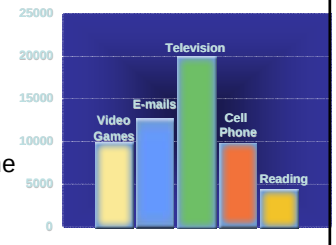
- *Digital Natives* (New millennial learners, Gen Y, iGeneration, etc.) do not know a world without the web and digital technology vs. *Digital Immigrants*
- Things they do differently: *communicate, share, buy and sell, exchange, create, meet, coordinate, evaluate, play games, learn, evolve, search, analyze, report, program digital devices, socialize, and grow up.*



Media exposure

By age 21, the Digital Natives will have spent:

- 20,000 hours TV
- 12,000 hours email/IM
- 10,000 hours video games
- 10,000 hours cell phone
- Under 5,000 hours reading



– Prensky in Oblinger

What are the implications of this?

- Digital natives may actually *think differently* due to neuroplasticity
- i.e. the brain changes and "rewires" itself differently based on the inputs it receives throughout life, especially when young
- Changes can occur in as short a time a 5-10 weeks with sharply focused attention (eg 100 min/da, 5 da/wk)
- Example: "They've outsourced their memory" (Ian Robertson, neuroscientist)

THE GLOBE AND MAIL

Learning to read at 93

'Come clean' on Arar, Harper tells Bush

"It all started with junk mail."

Clarence Brazier is about to spend the better part of a day telling one of the most remarkable stories this country holds.

It is the tale of a boy who took over the family farm by age 7, a youngster who survived the Spanish flu, became a logger and miner who survived various close brushes with death, a wood supplier who finally gave up his chainsaw at age 90 and who, at 100, has perfect vision, a full head of hair and can get out of his easy chair so quickly he sometimes looks like a gymnast executing a kip-up.

But none of this is remarkable.

Not compared with what Clarence Brazier decided to do at age 95 and accomplished by the time he was 93.

He learned to read.

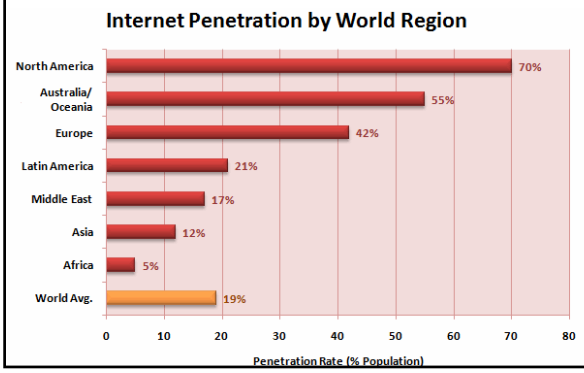
Don't do it, UN warns North Korea

1. What do we know about *access to learning*?

- Web learning has dramatically increased access, BUT
- Access is uneven throughout the world and typically correlated to income

The Digital Divide still exists

As of September, 2007. Source: www.internetworldstats.com



Middle East Internet Usage and Population Statistics

MIDDLE EAST	Population (2007 Est.)	Usage, in Dec/2000	Internet Usage, Latest Data	% Population (Penetration)	(%) of M.E.	Use Growth (2000-2007)
Bahrain	738,874	40,000	157,300	21.3 %	0.5 %	293.3 %
Iran	70,431,905	250,000	18,000,000	25.6 %	53.7 %	7,100.0 %
Iraq	27,162,627	12,500	36,000	0.1 %	0.1 %	188.0 %
Israel	7,237,384	1,270,000	3,700,000	51.1 %	11.0 %	191.3 %
Jordan	5,375,307	127,300	796,900	14.8 %	2.4 %	526.0 %
Kuwait	2,730,603	150,000	816,700	29.9 %	2.4 %	444.5 %
Lebanon	4,556,561	300,000	950,000	20.8 %	2.8 %	216.7 %
Oman	2,452,234	90,000	319,200	13.0 %	1.0 %	254.7 %
Palestine(West Bk.)	3,070,228	35,000	266,000	8.7 %	0.8 %	660.0 %
Qatar	824,355	30,000	289,900	35.2 %	0.9 %	866.3 %
Saudi Arabia	24,069,943	200,000	4,700,000	19.5 %	14.0 %	2,250.0 %
Syria	19,514,386	30,000	1,500,000	7.7 %	4.5 %	4,900.0 %
United Arab Emirates	3,981,978	735,000	1,708,500	42.9 %	5.1 %	132.4 %
Yemen	21,306,342	15,000	270,000	1.3 %	0.8 %	1,700.0 %
TOTAL Middle East	193,452,727	3,284,800	33,510,500	17.3 %	100.0 %	920.2 %

The next access issue to confront us…

- Is the Net really neutral?
- ISP's are being accused of giving priority to specific domains and protocols
- Examples: Google search given priority over e-mail to a friend? Music file sharing slow or doesn't get through?

2. What do we know about *costs of learning* with the web?

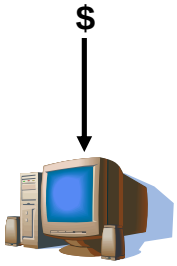
- Unlike 10 yrs. ago, computer infrastructure is now budgeted for just like any other item
- Most higher ed. institutions consider online learning to be a critical long-term strategy

Cost effectiveness

- Studies on cost effectiveness of online learning compared to face-to-face classes have not yielded very convincing results
- What assumptions should you make in a study?
- Possible exception: Twigg's Program in Course Redesign that per student cost savings averaged 41% when comparing the traditional format of the course to the redesigned format incorporating technology.

Hardware costs have tumbled

- $1000 was once the barrier to beat, but now $500 can buy a good system
- The new barrier is…



The $100 Computer

- It will "revolutionize how we educate the world's children… [and] …provide children around the world with new opportunities to explore, experiment, and express themselves." (Negroponte, MIT)

3. What about *improved learning*?

- My first study of achievement in online courses was in 1998 at my own institution
- Compared (1) face-to-face lectures; (2) traditional correspondence courses that used mail, telephone, and print materials; and (3) fully online courses.

Achievement Findings

- Web students got significantly higher grades than in-class courses; in-class significantly higher grades than correspondence (p<.005, n=5360)*

Course Mode	Mean	Std. Deviation	N
Correspondence	5.39	1.92	2127
In-class	5.60	1.86	2262
Internet	5.88	1.72	971
Total	5.57	1.87	5360

*Statistically significant but not educationally meaningful effect size

Student Overall Response

- 68% of respondents felt that the course *stimulated their interest* in taking further courses in the discipline
- 73% said that they would *recommend the course to their friends*, but these students did not generally feel that they had learned any more (or less) as a result of taking the course in online form
- 70% of those students responding felt their online course to be *average or better than average*

Studies by others

- My results were consistent with meta analyses of achievement (eg Bernard et al., 2004; Kulick, 2003; Kimitta and Davis, 2004)
- Namely, there's a slight positive effect size in favor of technology e.g. .10 to .40 over face-to-face, but considerable variation
- Therefore…

Justification for using the Web and its related technologies

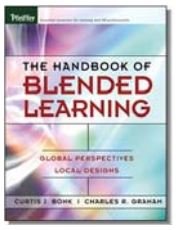
- *Unlikely* to be justified on the basis of economics (in higher ed.)
- Be wary of making achievement claims
- *Likely* can be justified in terms of access to learning and its appeal to the preferred ways of learning of the new generation of students

New e-learning technologies

1. Blended learning
2. Participatory web tools
3. Serious Games

1. New Technologies: Blended Learning

- Increasingly popular way of taking advantage of features of face-to-face and online learning
- Involves thoughtful re-thinking/re-structuring of a course, not just adding a technology component



Why use blended learning?

- Improved learning
  - ✓ Twigg (2003) reported that student learning improved in 20 of the 30 courses restructured with technology
- Increased access/flexibility
  - ✓ Suits lifestyle of students
- Improved Success Rates
  - ✓ UCF found blended courses consistently have higher success rates and lower withdrawal rates than their comparable face-to-face courses and fully online courses (Dziuban, et al., 2006)
- Improved pedagogy
  - ✓ My study of courses at 8 Canadian universities found faculty got to know their students better as individuals in blended courses; also high levels of student and faculty satisfaction (Owston et al., 2006)

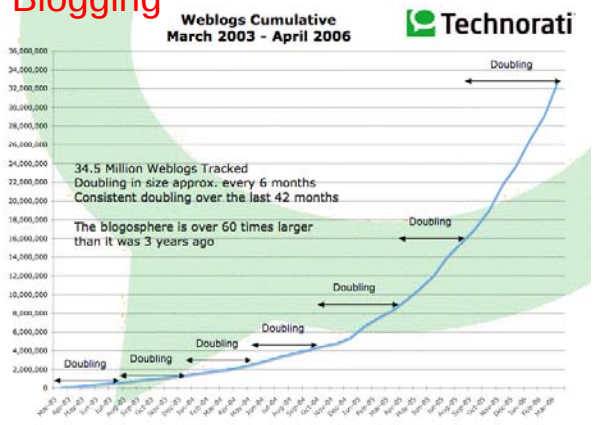
Some unanswered questions…

- Nature of the activities best suited for online and for face-to-face classes?
- Appropriate balance between the two instructional modes for particular kinds of courses?
- Creation and maintenance of a sense of community among students?
- Whether there are some subject areas where blended learning is more appropriate than others?

2. New Technologies: Participatory Web (Web 2.0)

- Blogs
- Wikis
- Podcasting
- Photo sharing: *Flickr*
- Video sharing: *YouTube*

Blogging



Why blog in courses?

- Not just a Western phenomenon: South Korea - 15 million bloggers; China - 5 million
- Reflection and sharing of thoughts on course content/ideas
- Writing to authentic audiences improves quality of work
- Consistent with the way Net Generation uses technology
- Avoids use of course management system

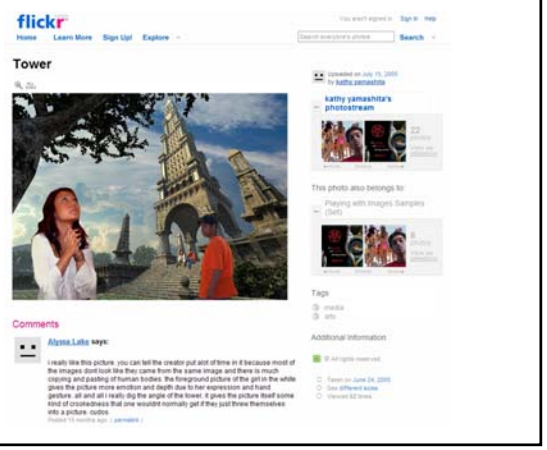
Why Wikis in higher education?

- Create content “on the fly”
- East to use collaborative workspace
- Allows all participants to contribute
- Creates “pride of authorship”
- Permits outside participants to contribute or critiques leading to better quality product

Wikis my grad course

EDUC5860 Issues in Digital Technology in Education

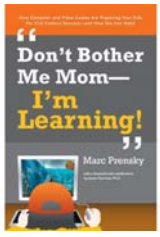
Podcasts



Teaching with Youtube

3. New technologies: Serious games and virtual worlds

- Games are about challenge, complexity, and engagement - Marc Prensky
- "Kids play games NOT because they are games, but because they're the most engaging intellectual thing they have"
- They are about 21st century learning…



Game Training For Laparoscopic Surgery

Dr. James Rosser, Beth Israel Hospital NYC

Video game designed to boost safety on oil rigs

Simulynx

Teaching about world hunger

United Nations Food Force

Solve Israel-Palestine Conflict!

Peacemakergame.com

Lowering stress levels in day-to-day life

MindHabits.com

What People Learn from *complex* Games

To cooperate, collaborate & work in teams, i.e. to work effectively with others

To make effective decisions under stress

To take prudent risks in pursuit of objectives

To make ethical and moral decisions

To employ scientific deduction

To quickly master & apply new skills and information

To think laterally and strategically

To persist and solve difficult problems

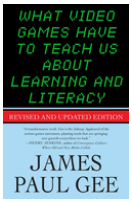
To understand and deal with foreign environments and cultures

To manage business and people

from Marc Prensky, 2006

Learning principles embodied in effective games - James Gee

"The theory of learning in good video games fits better with the modern, high-technology, global world today's children live in than do the theories (and practices) of learning that they see in school" (p. 7)



Teachers/ Curriculum Designers (Digital Immigrants) are used to	Students (Digital Natives) prefer
Content First	Engagement First
Presentation	Gameplay
Few Decisions	Frequent Decisions
One Thing at a Time	Multiple Data Streams
In Person	Online
Once-and-done	Iterative

ENGAGEMENT

from Marc Prensky (2006)

Virtual Worlds: Second Life

Simulation and Advanced Gaming Environments (SAGE) for Learning

- Canadian national network for serious game research (http://sageforlearning.ca)
- I'm leading Methodology and Tools domain
- Our team is
  - ✓ Developing the Virtual Usability Lab (http://vulab.ca)
  - ✓ Studying effects of student game development on literacy skills in grade 4 (http://gamestudy.ca)

Five Conclusions…

1. Research on web-based learning is still in its early stages
2. Learning is now more accessible to a greater portion of the population than ever before due to web
3. Costs are now part of the necessary infrastructure of schools and universities
4. Don't expect improvements in learning to be educationally significant over face-to-face
5. New web-based technologies/digital games promise potential for engaging students in ways consistent with their preferred learning modes

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