

# The World Wide Web Revisited

Ron Owston, PhD

Institute for Research on Learning Technologies  
York University  
Toronto, Canada

# Ten Years Ago

## ***RESEARCH NEWS AND COMMENT***

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

RONALD D. OWSTON

**N**othing before has captured the imagination and interest of educators simultaneously around the globe more than the World Wide Web.<sup>1</sup> 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?

These are tough questions—and

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...

# 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”
- 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.

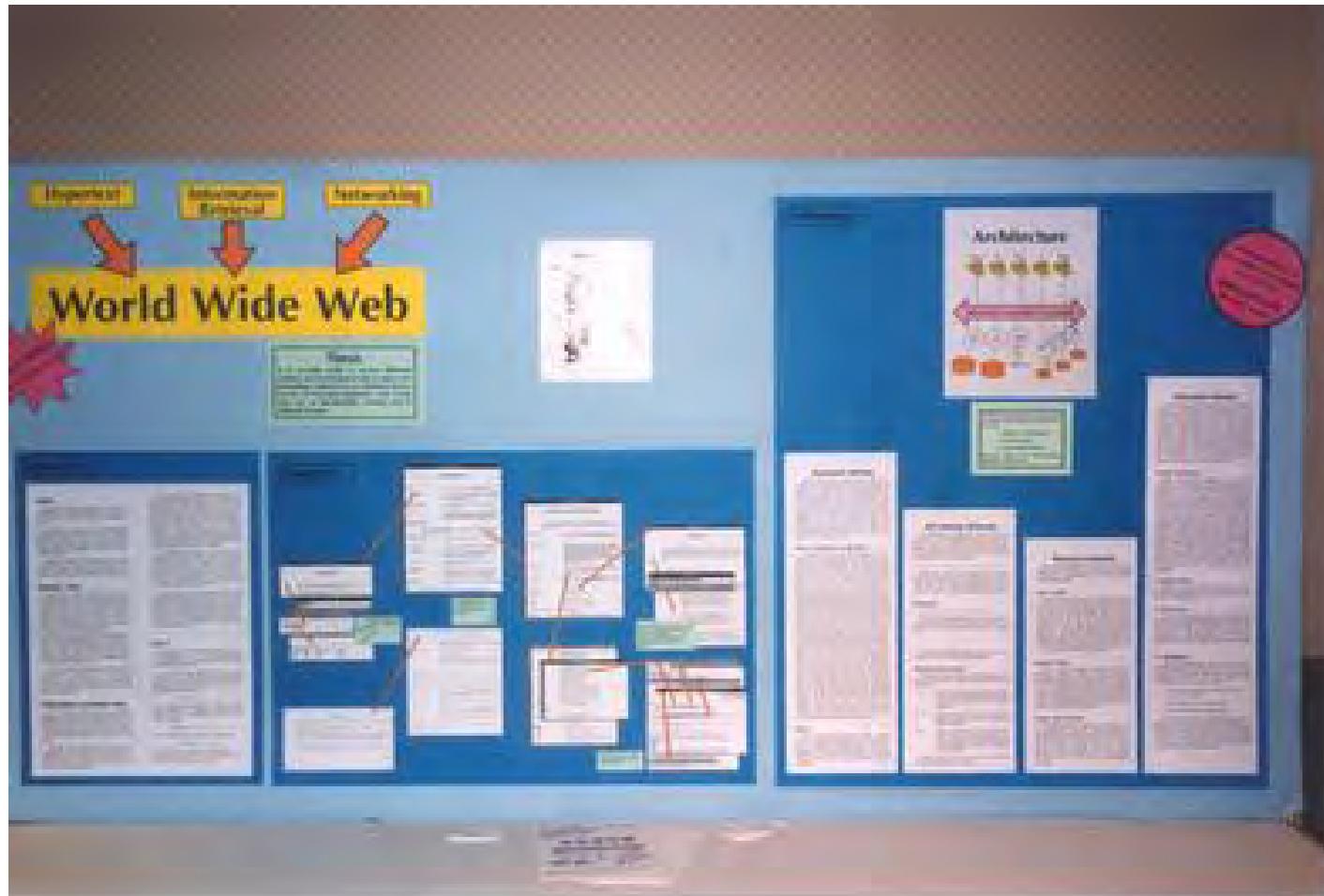
### [How can I help ?](#)

If you would like to support the web..

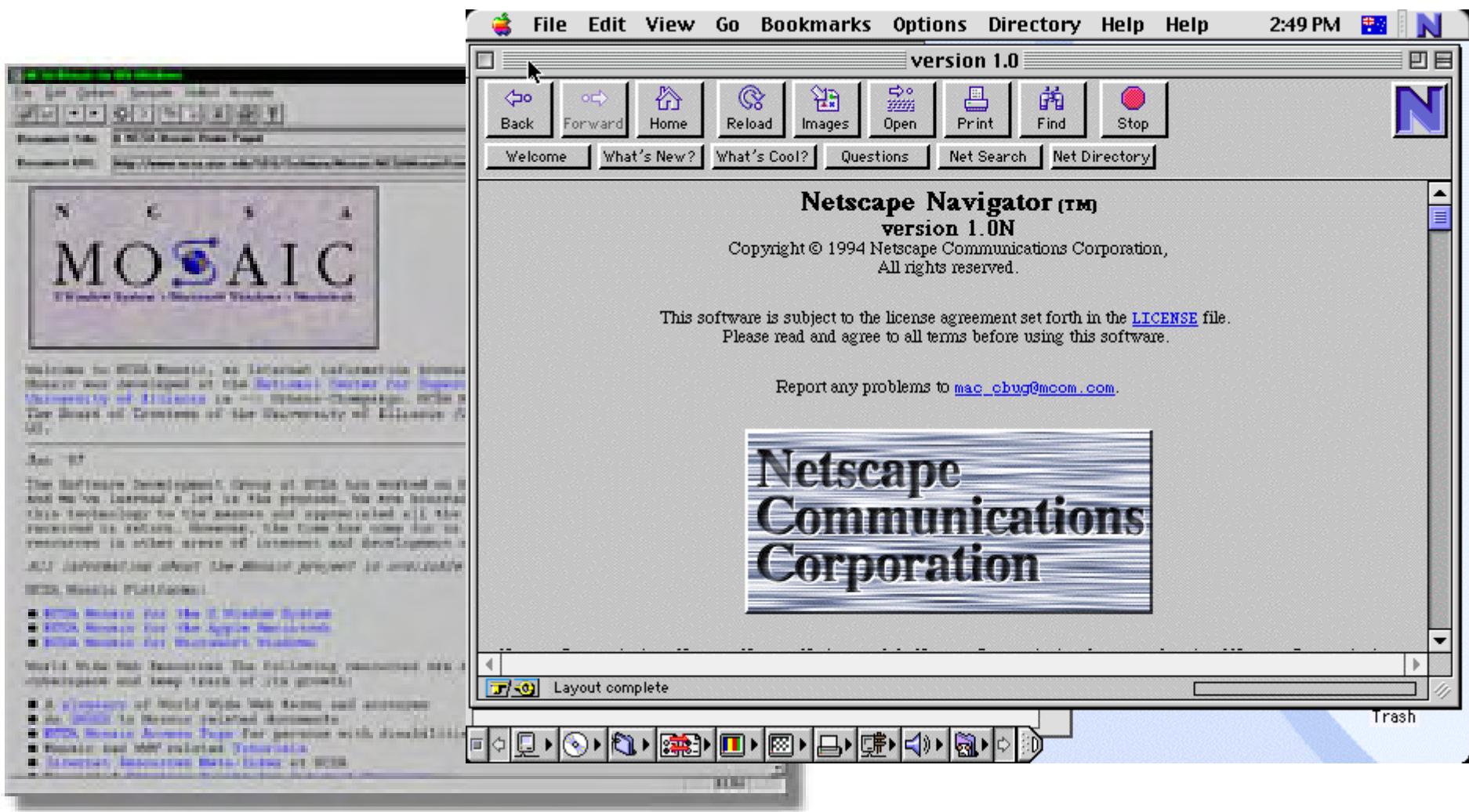
### [Getting code](#)

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



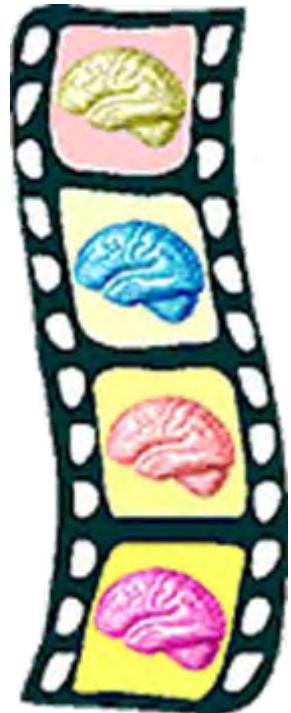
# Ten years after Netscape...

- 2/3rds of undergraduate and over 1/4 of graduate degree programs in institutions of higher education in the U.S. now offer Web-based courses.
- Rise (and fall) of virtual universities
- Numerous courses are available on the Web for public school students offered by school districts, state educational authorities, and non-profit and for-profit organizations.



# And the rise of the Net Generation

- Prensky (2006) *Digital Natives* 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.*
- Digital natives may actually *think differently* due to neuroplasticity



## Learning to read at 93



### "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 99 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 95.

He learned to read.

Clarence Brazier, who recently turned 100, reads a book this week at his home north of Sudbury, Ont. His wife, Lois, with his daughter, Davis Villeneuve, and her husband, Dan.

## 'Come clean' on Arar, Harper tells Bush

BY JEFF SAWYER, OTTAWA

Canada will provide copies of the U.S. handling of the Maher Arar security file and seek an explanation of the government's behaviour, Prime Minister Stephen Harper told President George W. Bush yesterday.

The United States has become a focus of the campaign for a sympathetic reading of Canadian file, Mr. Harper said. He told Mr. Bush in a telephone conversation.

Mr. Harper said he called Mr. Bush to tell him Canada is upset about the findings of an independent panel of inquiry that American officials had not been consult and consulted in their dealings with Canadian officials in the case.

Canada will seek a formal protest through formal diplomatic channels and expect a response, Mr. Harper said in Calgary.

"What I would like is an acknowledgement from the United States government to come clean with its version of events. To acknowledge, I would hope to acknowledge, the deficiencies in how the appropriate conduct that involved Canada in its dealing in its relationship with the Canadian government," Mr. Harper said.

See ARAR on page A1

## Don't do it, UN warns North Korea

BY ALAN FREEMAN, NEW YORK

The UN Security Council warned North Korea that it faces unspecified consequences if it goes ahead with its stated plan to test a nuclear weapon, citing the just world Human security and security.

The United Nations' amendment — adopted unanimously by the Security Council — comes three days after the secretive North Korean regime announced it would conduct a nuclear test in October, another test, following the United States' test, marking its third in as many months of nuclear weapons tests.

See NUCLEAR on page A1

Index, page A2

Obituaries, B8

# Research on teaching and learning with the web

- My ER article was the first to discuss the issue in an AERA journal
- Before 1997 ERIC listed “World Wide Web” only 471 times vs. 30,000 times for “computers OR microcomputers”
- The term did not appear in AERJ until 2000!



American Educational Research Association



Is there any wonder we know so little about teaching and learning with the web? But...

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

According to Sloan Foundation  
(2005)

- 3 million people taking online higher ed courses in the U.S. today (1/5 higher ed pop'n) in variety of subject areas
- Growth rate is 20% annually compared to 1.5% for higher ed system



# Access in public schools

- Updated stats. harder to get: most recent NES based on 2002-03 suggests 328,000 students
- Virtual High School enrolls 7500/yr in high school, Pre-AP and AP courses
- Florida Virtual School enrolled 31,000 last year in 80 courses, gr. 6 – 12
- Michigan Virtual High School has served 125,000 since inception in 2000.



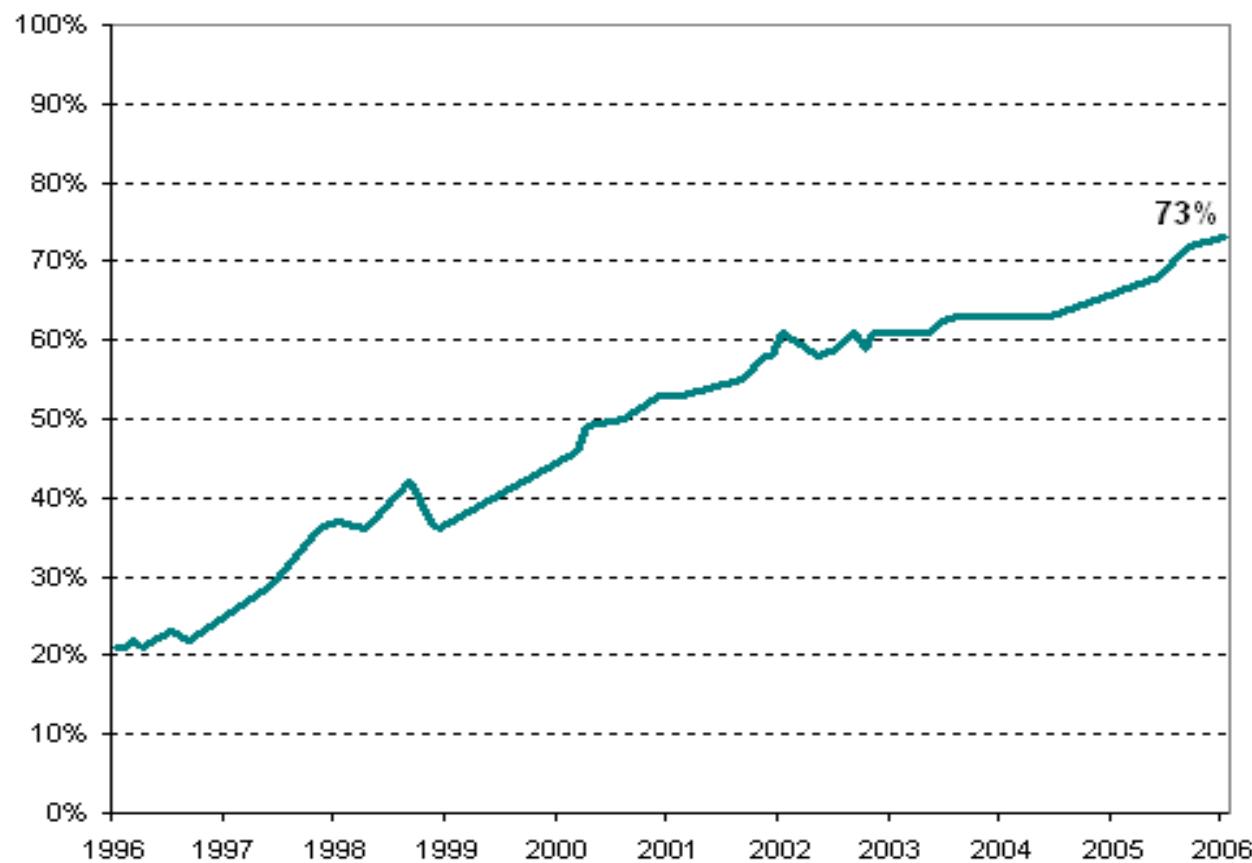
# Digital Divide

- At the time of writing my article the issue of technology *haves* and *have nots* or what is now called the *digital divide* did not receive much attention.
- e.g. “digital divide” appeared only once in ERIC before 1997



# Internet Access

**Percent of U.S. Adults Who Go Online, 2000-2005**  
Pew Internet & American Life Project



# Progress toward closing the gap

- Similar numbers go online in Canada
- Near universal access in school and universities
- 74% of white adults go online, compared to 61% of African American adults, and 76% of English-speaking Hispanics (Pew, 2006)
- **BUT** only 53% of adults living in households with less than \$30,000 in annual income go online compared to 91% of adults living in households earning more than \$75,000 (Pew, 2006)

# Access Redefined

- My original question needs to be defined not about the notion of simply access to learning, but it needs to ask:  
“What are the inequalities of access to learning and can they be overcome?”
- We don’t need more research on the gap itself, but we need strategies/programs to overcome the gap (which should be evaluated)

## 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
- 56% of higher ed institutions consider online learning to be a critical long-term strategy (Sloan, 2005).
- 90% of institutions use a course management system e.g. WebCT (EDUCAUSE survey)

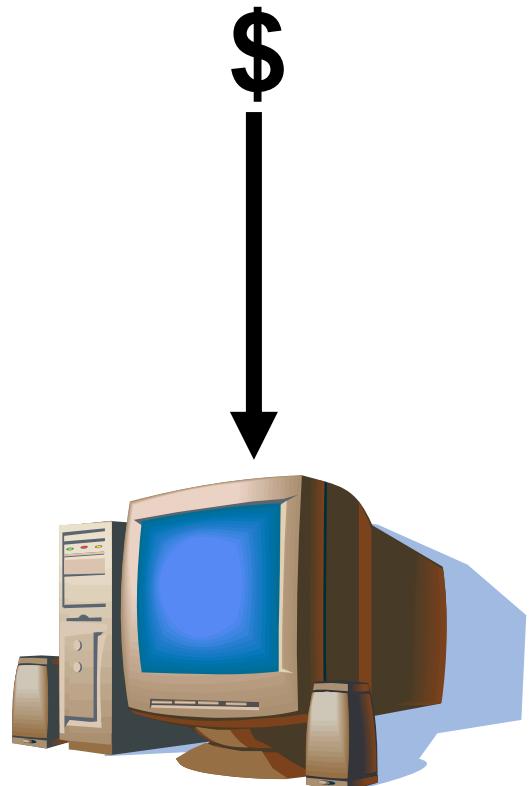


# Cost effectiveness

- Studies on cost effectiveness of online learning compared to face-to-face classes **have not yielded very convincing** results because of complexity in gathering costing data and deciding what to include.
- 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

- The \$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, and
- 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 the online course they were taking to be of *average or better than average*

# Studies by others

- My results were consistent with subsequent studies and meta analyses (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...

# Research needed

- What is needed is not more research comparing the web with face-to-face, but to study ways of designing web based learning to maximize the benefits

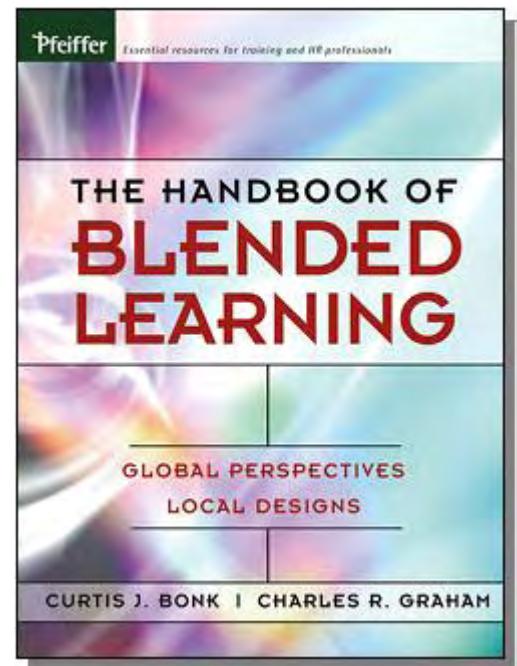
# New web-based technologies in need of research

- Blended learning
- Participatory web tools
- Serious Games



# 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



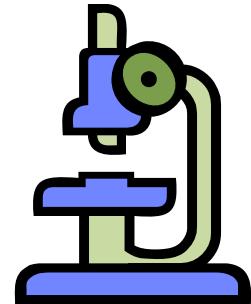
# Research on blended learning

- Twigg (2003) reported that student learning improved in 20 of the 30 courses restructured with technology
- 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)
- 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)



# Issues needing research include...

- Nature of the activities best suited for online and for face-to-face classes
- The 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 course subject areas where blended learning is more appropriate than others.



# New Technologies: Participatory Web

- Blogs, wikis, podcasts
- Flickr: photo sharing; YouTube: video
- MySpace: social community
- del.icio.us: bookmark sharing
- Wikipedia: public domain encyclopedia

# Blogs

## Stephen's Web

### Projects&Collaborations

Browse through the thousands of links in my knowledge base sorted according to topic category, author and publication.

### Research

Browse through the thousands of links in my knowledge base sorted according to topic category, author and publication.



### Stephen Downes

Leaning on the wall atop the castle at Sintra, near Lisbon, Portugal, on a windy day, September, 2003.

### About Me

Bio, photos, and assorted odds and ends

[\[OLDaily\]](#) [\[Archives\]](#) [\[Threads\]](#) [\[Best Of\]](#) [\[Search\]](#) [\[Options\]](#)

Edu\_RSS Latest: [Edu\\_RSS](#) - the latest news in Educational Technology, updated hourly

### Blackboard Patent Information

The full update is [here](#).

### Welcome Wired Readers

The excerpted post on Superman is [here](#).

## Today's News

News is updated every weekday. For more information and to subscribe by email or RSS, [click here](#). For the most popular news items from the last week, [click here](#).

### John Blau: Sony Launches GPS for Cameras, PC World

October 2, 2006

[link: 2 Hits] Excellent. GPS for cameras. Too bad it had to come from Sony. Is it going to have some DRM attached to it? Will it write some sort of rootkit (it does require a software install - and yes, I am still made at Sony about that, since they've never altered the corporate philosophy that led to the fiasco). [Tags: ] [\[Comment\]](#)

# Wikis

One Laptop per Child

[Log in / create account](#)

[article](#) [discussion](#) [edit](#) [+](#) [history](#)

## Talk:One Laptop per Child

**Contents** [\[hide\]](#)

- 1 Feedback from the future
- 2 Basic Needs
- 3 Making the Case for the Integration of ICT with Sustainable Development to Promote a Community Oriented Development Model
- 4 Comments from students in graduate education course
  - 4.1 Group A
  - 4.2 Group B
  - 4.3 Group C
  - 4.4 Group D
- 5 ...Foot power...
  - 5.1 Hand Crank
- 6 Uses of the Green Laptops, beyond Youth Education....
- 7 We should really add a Myths section
- 8 MUST haves
- 9 one laptop/alphaSmart
- 10 Any lessons from that PC from India to teach to read & write?
- 11 Damn Small Linux?
  - 11.1 PuppyLinux Too
  - 11.2 Pandora Another Choice
- 12 Travelers
- 13 Problems with \$100 Laptop

# Podcasts

File Edit Controls Visualizer Advanced Help

iTunes

Source Stanford Faculty Lectures - Audio

Search Music Store Browse

Library Podcasts Videos Party Shuffle Radio

Music Store

90's Music My Top Rated Recently Added Recently Played Top 25 Most Played Adam Curry iPodder ... CMEC Forum 2005 Stanford

Now Playing Nothing Playing

Faculty Lectures

Lectures, seminars and panel discussions featuring renowned Stanford faculty from across the disciplines.

Last Modified: Aug 17, 2006

Tracks in Audio: 64

GET TRACKS SUBSCRIBE

Links

- Stanford University
- Stanford Alumni Association
- Bio-X
- Freeman Spogli Institute
- Center for Comparative
- Reunion Homecoming
- Philosophy Talk
- Entitled Opinions

Audio Best of Philosophy Talk Entitled Opinions Video Microdocumentaries Travel/Study

	Name	Time	Artist	Album	Price	
23	Whitehead's Account of the Six...	2:56:59	Isabelle Stengers,...	Stanford Humaniti...		GET SONG
24	Documentary Film: Behind the ...	56:59	Jan Krawitz	Stanford Day In H...		GET SONG
25	Introductory Remarks: Internat...	52:07	John Hennessy, C...	Freeman Spogli I...		GET SONG
26	Media, Nation, Performance	44:47	Ju-Yon Kim, Karen...	Asian American Fi...		GET SONG
27	History, Nation, Masculinity	1:20:40	Karen Kuo, Steve...	Asian American Fi...		GET SONG
28	Charter Schools	1:13:43	Larry Cuban, Heat...	Ethics in Society		GET SONG
29	Squandered Victory: The Amer...	1:34:16	Larry Diamond, '7...	Regional Speaker...		GET SONG
30	Looking Ahead: Governance an...	1:24:09	Larry Diamond, Jo...	Freeman Spogli I...		GET SONG
31	Popular Constitutionalism and J...	1:15:13	Larry Kramer	Regional Speaker...		GET SONG
32	Aging and the Perception of Ti...	50:49	Laura Carstensen	Stanford Day In LA		GET SONG
33	Inside the American Couple	1:25:43	Laura Carstensen...	Reunion Homeco...		GET SONG
34	The Economics and Politics of ...	58:10	Lawrence H. Goul...	Stanford Day In LA		GET SONG
35	International Policy and Security	50:29	Mariano-Florentin...	Stanford Day In H...		GET SONG

64 songs

## Tower

ALL  
SIZES

### Comments

[Alyssa Lake](#) says:

i really like this picture. you can tell the creator put a lot of time in it because most of the images don't look like they came from the same image and there is much copying and pasting of human bodies. the foreground picture of the girl in the white gives the picture more emotion and depth due to her expression and hand gesture. all and all i really dig the angle of the tower, it gives the picture itself some kind of crookedness that one wouldn't normally get if they just threw themselves into a picture. cudos

Posted 15 months ago. ([permalink](#))Uploaded on July 15, 2005  
by [kathy yamashita](#)

### [Kathy yamashita's photostream](#)

22  
photos  
[View as slideshow](#)

This photo also belongs to:

### [Playing with Images Samples \(Set\)](#)

8  
photos  
[View as slideshow](#)

### Tags

 media  
 arts

### Additional Information

© All rights reserved

- Taken on June 24, 2005
- See [different sizes](#)
- Viewed 52 times

# Serious games

- Today's students are no longer the people our educational system was designed to teach (Prensky, 2006)
- By the end of university, students spend 5000 hrs reading, but 10,000 hrs playing video games
- One third (32%) of students surveyed admitted playing games that were not part of the instructional activities during classes (Pew, 2003)
- Games are about challenge, complexity, and engagement



# complex

# What People Learn from 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**

# The Challenge...

- How to make classroom learning as engaging as games

“Whenever I go to school I have to ‘power down’  
– *a high school student*

“A lot of teachers think they make a  
PowerPoint and they’re so awesome!”  
-- a (female) high school junior

“I don’t want to *study* Rome in high school.  
Hell, I *build* Rome every day in my online  
game (Caesar III).”  
– *Colin, Age 16*

Teachers/  
Curriculum Designers  
(Digital Immigrants)  
are used to

- Content First
- Presentation
- Few Decisions
- One Thing at a Time
- In Person
- Once-and-done

Students  
(Digital Natives)  
prefer

- Engagement First
- Gameplay
- Frequent Decisions
- Multiple Data Streams
- Online
- Iterative

*ENGAGEMENT*

*"ENGAGE ME*

*or*

*ENRAGE ME"*

# 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. Focus research on how new web-based technologies can enhance the learning experience in ways other than overall achievement

# Contact Info

- Email: [rowston@edu.yorku.ca](mailto:rowston@edu.yorku.ca)
- Institute for Research on Learning Technologies  
<http://www.yorku.ca/irlt>
- Homepage:  
<http://www.edu.yorku.ca/~rowston>

