





## Digital Thinking, Digital Learning: Twenty-First Century Skills as a Requisite for Life in a Flatter Learning World

**Curtis J. Bonk, Professor, Indiana University**  
 President, SurveyShare  
 cjbonk@indiana.edu  
<http://php.indiana.edu/~cjbonk>


## The Learning World has become Flat!





## Singapore and Taipei

(Intel Press Release, 2006)

- Singapore, the island city-state in Southeast Asia, is about to complete a major new public/private project that will see large chunks of the 270 square mile city provided with Wi-Fi access by the end of 2008. The entire city, indoors and out, is due to be covered by 2015.
- In the coldest capital in Canada, the city residents of Iqaluit (pop. 6,000) enjoy free wireless from one free hotspot (with two more due soon to cover the suburbs), while Taipei, Taiwan (pop. 2.6 million) has a few more—over 4,000 hotspots that provide coverage for 90 percent of the city.

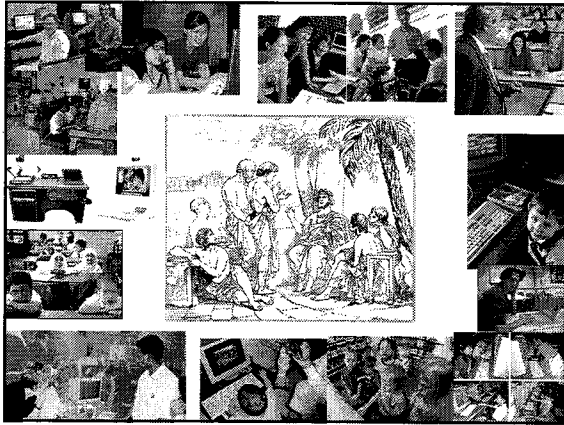
## The Ten Forces that Flattened the Learning World

1. Tools for Searching/Finding Media and Information Resources
2. Availability of Quality Online and Blended Learning Environments
3. Free and Open Source Software for Learning
4. Open CourseWare (free content)
5. Online Learning Object Repositories and Portals (shared content)
6. Virtual Collaboration Software (synchronous and asynchronous)
7. Online Massive Gaming, Simulations, and Virtual Worlds (e.g., Second Life)
8. Learning Mobility and Portability (low-cost mobile devices+wireless communication)
9. Personalized Learning Tools (Blogs, Podcasts, MySpace, Flickr, and RSS)
10. Open Information Communities (Wikipedia, Slashdot, Digg)

## Who is the world flattening for?





## Telegraph: Flattening the world in 1860

**Blogging now begins young**

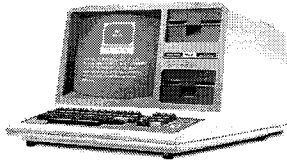
USA Today, November 15, 2006

**Eighth-grade students Tayler Bernholtz, left, Amy Lostro and Kelsey Cardiff check out a weblog discussion related to the Civil War historical-fiction book 'Guerrilla Season' At South Valley Junior High School in Liberty, Mo. (Blogging now begins young USA Today, By Ashley Bleimes, USA TODAY, November 15, 2006, 12D). [http://www.usatoday.com/life/2006-11-14-blogs-education\\_x.htm](http://www.usatoday.com/life/2006-11-14-blogs-education_x.htm)**

## Schools, Teachers, and Students of the 1880s

## Many Innovative Technologies in by people in this audience

## Technology of the 1980s



### Radio Shack TRS-80 Model III

Introduced: July 1980  
 Price: US \$699 base model  
 US \$2495 w/ 32K, dual drives.  
 CPU: Zilog Z-80, 2.03 MHz  
 RAM: 4K, 48K max.  
 Ports: Cassette tape, expansion, serial  
 Display: 12-inch BMW monitor; 64 X 16 text  
 Storage: 0, 1, or 2 internal 178K floppy drives  
 External cassette @ 500 / 1500 baud  
 OS: BASIC in ROM, TRS-DOS on disk

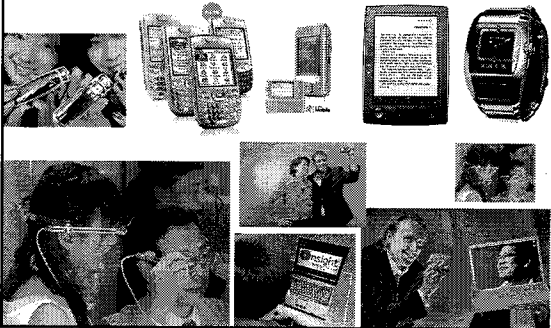


## Connecting the Digital Dots: Literacy of the 21st Century

Barbara R. Jones-Kavalier and Suzanne L. Flannigan  
 Educause Quarterly (2006), 29(2)

**"These days, new media literacy technical skills catapult traditional learning methods into orbit—traditional chalkboards and overheads with pens do not occupy the same realm as current capabilities. As an example, now teachers can do a PowerPoint presentation with streaming video, instant Internet access, and real-time audio-video interaction, and they can do it with relative speed and ease."**

## Technologies of the 2000's



## Students click on learning

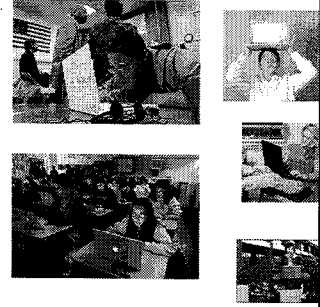
### New school laptops help Jonas Salk pupils up their grades

By Chelsea Phua - Bee Staff Writer  
 Published 12:00 am PDT Thursday, April 5, 2007  
 Story appeared in ARDEN CARMICHAEL section, Page G1

#### Students click on learning

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 # PIC: 4E568 # C:04040407

Jonas Salk is a public magnet school in San Diego, Calif., that has become a technology magnet. The school has been a leader in using technology to improve learning. The school has been a leader in using technology to improve learning. The school has been a leader in using technology to improve learning.



## Poll #1: Should kids be allowed to bring mobile phones, MP3 players (iPods) to school?

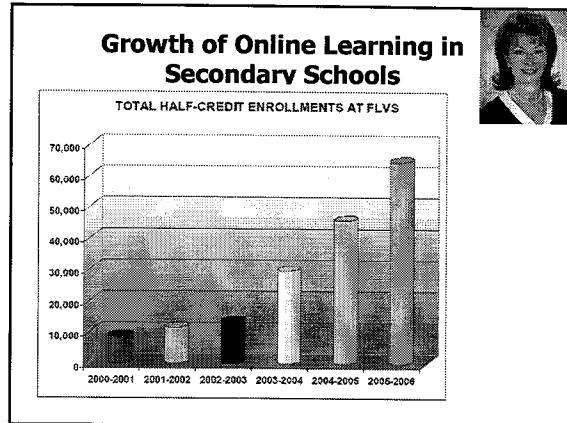
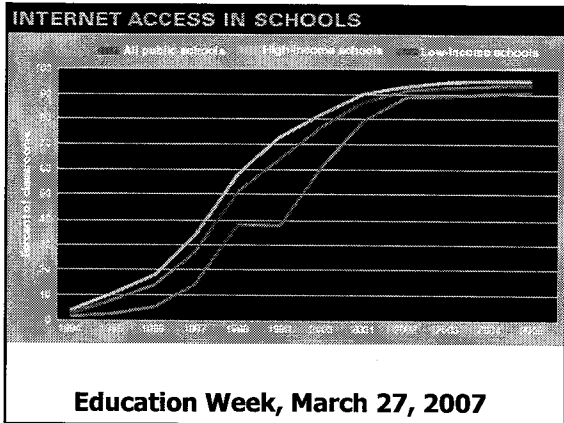
MiamiHerald.com

**Board OK's flip-flops, but iPods are out!**  
 Flip-flops are in for high school kids, out for everyone else. ABC cut: bed-on clipboard, untanned clothes, iPods and laptops.

EDUCATION WEEK

Glenda CB0001  
 \$200 million spent on the U.S. labor market  
 Agoda.com  
 Free trial

Technology Covers A Digital Decade  
 Ed Tech Evolution  
 The Information Age  
 The Information Age  
 The Information Age



- Monday April 30, 2007, USA Today  
**Top 25 Things that Shaped the Internet**
- 747 Million adults logged on in Jan, 2007
  - 97 billion e-mails are sent each day
  - Google had 500 million visitors in Dec, 2006
  - USA: 1% broadband in 1998; 78% in 2007
  - YouTube bought by Google for \$1.7 billion
  - Adobe's Flash player on 98% of machines
  - There are 75 million blogs!!!
  - 19 million people play MMOG!
  - 173 million personalized pages in MySpace

**Poll #2:**  
**Raise your hands if you are a digital native (grew up with a computer at home).**

### Next Generation of Students

Tech Creates Bubble for Kids  
 Alejandro Gonzalez, USA TODAY, Updated 6/20/2006 10:34 AM ET

### INFORMATION TECHNOLOGY

## Bonk's Addiction Q'er

1. Who has 2 or more cell phones with Internet access?
2. Who has 2 or more laptop computers with wireless connections?
3. Who is on email in the morning? At noon? Who does it at night?
4. Who suffers from nervous tension when you cannot get on email?
5. Who is on the Web right now?

## Neomillennial Learning Styles

Planning for Neomillennial Learning Styles: Implications for Investments in Technology and Faculty  
Chris Dede, Harvard University, Educause, 2005

- Fluency in multiple media--value all types of communication, activities, experiences, not a single best medium
- Actively seek, collect, and synthesize experiences, rather than absorb a single best source
- Active learning and collective reflection
- Non-linear and associated webs of learning
- Co-design of learning experiences for individual needs and preferences not pre-customized

## Simulation: Xer

- "The skill to be valued in the twenty-first century is not the length of attention span, but the ability to multitask - to do many things well at once.... [and] the ability to process visual information very rapidly." (Rushkoff, 1996:50)



**What Students Need to Know:  
21<sup>st</sup> Century Skills and ICT literacy;**  
Susan D. Patrick, President and CEO  
North American Council for Online Learning

The future will demand people who can express themselves effectively with images, animation, sound, and video, solve real world problems that require processing and analysis of thousands of numbers, evaluate information for accuracy, reliability, and validity; and organize information into valuable knowledge, yet students are not learning these skills in school.

From: The Partnership for 21st Century;  
[www.21stCenturySkills.org](http://www.21stCenturySkills.org)  
Report: are they really ready to work (2006).  
[http://www.21stcenturyskills.org/documents/FINAL\\_REPORT\\_PDF\\_9-29-06.pdf](http://www.21stcenturyskills.org/documents/FINAL_REPORT_PDF_9-29-06.pdf)



**What Students Need to Know:  
21<sup>st</sup> Century Skills and ICT literacy;**  
Susan D. Patrick, President and CEO  
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- Information and communication skills;
- Thinking and problem-solving skills;
- Interpersonal and self-direction skills;
- Global awareness;
- Financial, economic, and business skills; and
- Civic literacy.

From: The Partnership for 21st Century;  
[www.21stCenturySkills.org](http://www.21stCenturySkills.org)  
Report: are they really ready to work (2006).  
[http://www.21stcenturyskills.org/documents/FINAL\\_REPORT\\_PDF\\_9-29-06.pdf](http://www.21stcenturyskills.org/documents/FINAL_REPORT_PDF_9-29-06.pdf)

## Megabits

(p. 59 May/June 2007, Tech Trends)

"More than 60 percent of educators said that their schools are not putting enough emphasis on media literacy; and 80 percent said that they have to learn media literacy on their own..."

The results of the CIC Educator Survey, **Media Literacy: A Vital and Underserved Need in Schools**, can be found online at <http://i.ciconline.org/docs/CICmedialitreport11-2006.pdf> (November, 2006)

The results of the CIC Educator Survey, Media Literacy:  
 A Vital and Underserved Need in Schools  
<http://i.ciconline.org/docs/CICmedialitreport11-2006.pdf>

Media literacy is a key 21st Century skill because it provides a framework and method to think critically about the media and technologies students and adults use for information and entertainment. Media literacy means knowing how to access, understand, analyze, evaluate and create media messages on television, the Internet and other outlets. It also means knowing how to use these and other technologies safely, productively and ethically.



## What is "ICT Literacy"?

(Brown & Dotson, May/June 2007, Tech Trends)

- Define info need
- Collect & manage info from digital envirs
- Interpret into using ICT skills for comparison, analysis, & synthesis
- Evaluate info for authority, bias, & timeliness
- Communicate findings through creative use of ICT tools and resources

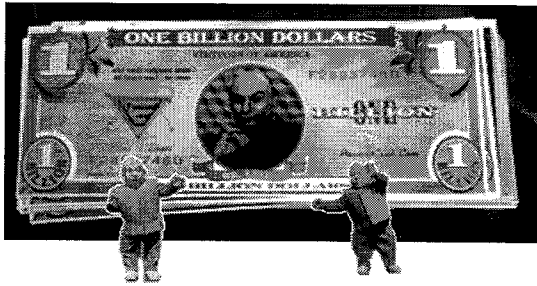
### ...using ICT tools, students can:

1. Define: Select approp research topic, frame q, identify approp resources.
2. Access: Locate and retrieve digital primary resources useful for answering the research question.
3. Manage: Organize info, summarize content, report content that answers research question.
4. Integrate: Read and interpret info using synthesis, summarization, critical thinking, perspective taking, comparison & contrast, & read and interpret multiple sources.

### ...using ICT tools, students can:

5. Evaluate: Make judgments on usability of info, authority of sources, bias, timeliness of the materials.
6. Create: Adapt, apply, and design a report with conclusions to the original question.
7. Communicate: Design report appropriate for audience and is clearly communicated and understood.

## Ok, Million Dollar Question: What are 21<sup>st</sup> Century Skills?



If you had to give a word or phrase to describe "21<sup>st</sup> Century Skills," what would that word be?

Locate info, synthesize it,  
 Decision making,  
 Use effectively and ethically,  
 Communicate effectively,  
 Evaluate products,  
 Producers and consumers of visual info,  
 Informed critics,  
 Sensitive to bias and cultural differences,  
 Sets own goals,  
 Willing to make mistakes,  
 Comparison and contrast skills, inferencing skills,  
 Participate in a team, exercise leadership,  
 Manage technology for public good

## Digital Literacy (Bonk, June 2, 2007)



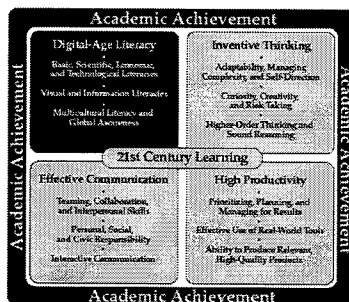
- Digital literacy is the ability to browse, locate, filter, synthesize across, and eventually use information appearing in multiple formats and in a wide range of sources that can lead to communication of what one discovered as well as the production of still additional information. (Paul Gilster (1997), Digital Literacy.)

## Digital Literacy (Bonk, June 2, 2007)

- Digital literacy is not only technology related knowledge, skills, and competencies, but also the critical and creative thinking skills as well as ability to engage in collaborative teams to find and solve problems in a technologically reliant society or environment.



## 21<sup>st</sup> Century Skills (NCREL, Learning Point Associate, 2003)



New programs teach undergraduates how to use the Internet and the online card catalog in search of the best sources  
Chronicle of Higher Education, Andrea Foster, March 9, 2007  
<http://chronicle.com/free/v53/i27/27a03801.htm>

- College students use technology constantly. They text-message friends, compile playlists for their iPods, and are whizzes at updating their MySpace profiles. But when it comes to one kind of work they are required to do in college — namely, academic research — they can be inept. Too often, college officials say, students rely on Google or Wikipedia as sources, as if oblivious to peer-reviewed scholarship.

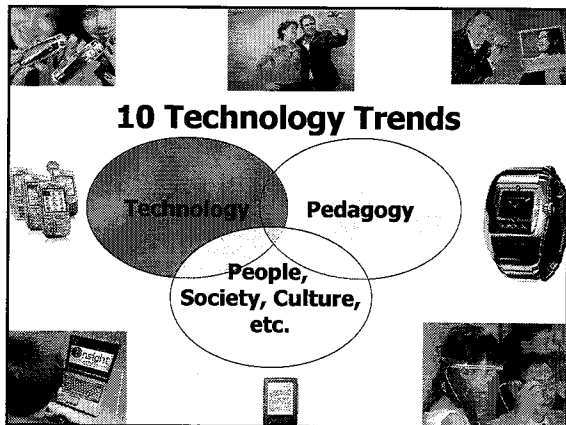
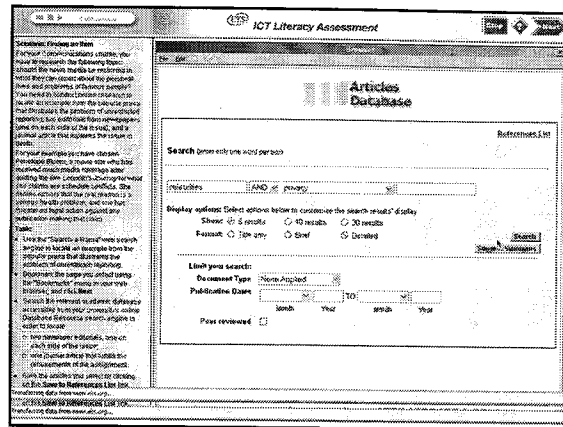
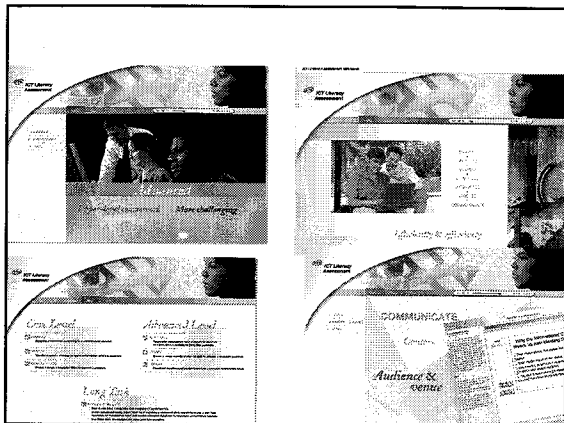


New programs teach undergraduates how to use the Internet and the online card catalog in search of the best sources  
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- The explosion of electronic information is fueling students' confusion, librarians say. In 1996 there were 10,000 scholarly databases online; now they exceed 18,000. The Web is teeming with more than 100 million sites, up from 18,000 in 1995. Google and Microsoft recently began archiving books and scholarly journals and making them available via their search engines. And two online, academic-oriented encyclopedias, Citizendium and Scholarpedia, are starting up...

New programs teach undergraduates how to use the Internet and the online card catalog in search of the best sources  
Chronicle of Higher Education, Andrea Foster, March 9, 2007  
<http://chronicle.com/free/v53/i27/27a03801.htm>

- Among the most well known is the ICT Literacy Assessment, which was developed and is administered by the Educational Testing Service, a nonprofit group based in Princeton, N.J. "ICT" stands for "information and communication technology." The 75-minute test, offered at two levels, measures students' ability in seven areas, including organizing, evaluating, and communicating with electronic data.



**Trend #2: Blogging**

**Blogging Questions**

1. Who has a blog? Any for a specific class?
2. Who regularly reads other people's blogs?
3. Who assigns blogging tasks?
4. Who has created a video blog?
5. Who thinks it is an utter waste of time to blog?

EDTECH 2008

**Use of Weblogs**  
(especially English writing class)

1. **Instructor or Tutor blog:** resources, information, space to chat
2. **Learner blog:** reflections, sharing links and pics, fosters ownership of learning
3. **Partner blog:** work on team projects or activities
4. **Class blog:** international exchanges, projects, PBL
5. **Revision:** review and explode sentences from previous posts, add details
6. **Nutshell:** summarize themes or comments across blogs
7. **Blog on blog:** reflections on feelings, confusions, and experiences with blogs





## Language Learning (ChinesePod—learn Mandarin)

The screenshot shows the ChinesePod website interface. At the top, it says 'Learn Mandarin on Your Terms'. Below that is a 'Podcast Archive' section with a list of episodes. A featured episode is highlighted with a photo of Jenny Zhu and the title 'ChinesePod 101: How to learn Mandarin'. The page includes navigation links like 'Home', 'About', 'Contact', and 'Podcast Archive'.

## Educational Applications of Podcasting (Essex, 2006, Leftwich, 2007)

1. Recordings of lectures (Coursecasting)
2. Supplemental textbook or entire book
3. Student projects
4. Interviews
5. Language lessons
6. Oral reports
7. K-12 classroom interactions
8. Downloadable library of resources
9. Recordings of performances

## Trend #5. \$100 Laptop

**The project aims to build peer-to-peer communications**

**Negroponte says the new laptop is designed to be kid-friendly**

**OLPC aims to turn the tide of urban poverty**

**The CM1: Taking technology to the developing world**  
*A revolution in a laptop*  
*By Greg Norman*  
 Sunday 13 August 2006, 18:49  
 Makka Time, 15:49 GMT

**OLPC aims to turn the tide of urban poverty**

**Trevor, 12, Adriano, 12, and Okeeno, 13, listen back to the report they have recorded on an iPod.**

**Amy, 13, writes her news script.**

**Ivan, 12, records his news report.**

**Lambeth CLC technician George Belfield edits the students' work.**

**Uryas, 12, and Ivan, 12, research their news story.**

## Trend #6: Virtual Worlds/Virtual Reality/MMOG First Course in a Virtual World (Second Life)

The screenshot shows a virtual world interface with avatars in a 3D environment. There are various UI elements like a 'You Tube' logo and a 'Chat' window.

## Trend #7. Language Learning

The screenshot shows a language learning software interface. It features a man wearing a headset and speaking into a microphone, likely a virtual teacher or student. The interface includes various text and audio elements.

### Trend #8. Digital Books

By Kim Rahn, March 7, 2007. Digital Textbook to

**...ance and  
...ugh  
...ont the**

The image shows a screenshot of a digital textbook interface on a tablet. The interface includes a search bar, navigation buttons, and a main content area with text and images. The text discusses the benefits of digital textbooks, such as portability and interactive features.

### Trend #9. OpenSource Tools

A collage of various open-source software interfaces and logos. It includes screenshots of web-based tools, code editors, and logos for projects like Moodle, Drupal, and Joomla. The collage illustrates the diversity and availability of open-source educational tools.

### Trend #10. Participatory Video Repositories

**The Learning World is Flat**

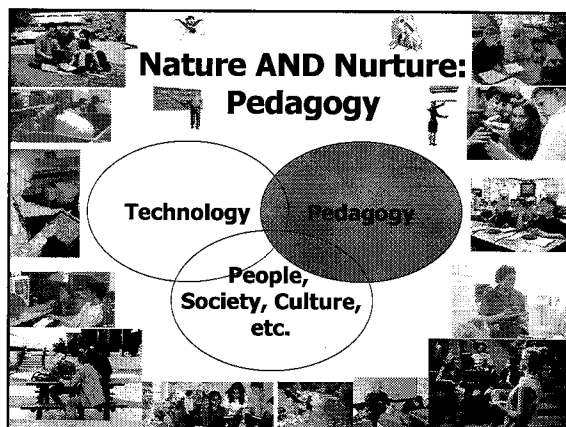
**YouTube**

**HFwj7U4w**

The image shows a screenshot of a YouTube video player. The video title is "HFwj7U4w" and it features a man speaking. The interface includes the YouTube logo, video title, and player controls.

**Connecting the Digital Dots: Literacy of the 21st Century**  
 Barbara R. Jones-Kavalier and Suzanne L. Flannigan  
 Educause Quarterly (2006), 29(2)

**"The greatest challenge is moving beyond the glitz and pizzazz of the flashy technology to teach true literacy in this new milieu. Using the same skills used for centuries—analysis, synthesis, and evaluation—we must look at digital literacy as another realm within which to apply elements of critical thinking."**



### Some Motivational Ideas

**The New Gender Divide**

The image contains several illustrations related to motivational ideas. On the left, there is a person sitting on a cart. In the center, there is a person standing next to a large book. On the right, there is a person sitting at a desk. The text "The New Gender Divide" is visible in the upper right corner.

## TEC-VARIETY Model Online Motivational

1. **Tone/Climate: Psych Safety, Comfort, Belonging**
2. **Encouragement, Feedback: Responsive, Supports**
3. **Curiosity: Fun, Fantasy, Control**
- ...
4. **Variety: Novelty, Intrigue, Unknowns**
5. **Autonomy: Choice: Flexibility, Opportunities**
6. **Relevance: Meaningful, Authentic, Interesting**
7. **Interactive: Collaborative, Team-Based, Community**
8. **Engagement: Effort, Involvement, Excitement**
9. **Tension: Challenge, Dissonance, Controversy**
10. **Yields Products: Goal Driven, Products, Success, Ownership**

## 1. Tone/Climate: a. Scavenger Hunt (Find Fellow Students Social Networking Software)

Oct 6, 2006, Chronicle

## 2. Encouragement, Feedback, etc.: A. Critical/Constructive Friends, Email Pals...

## 4. Variety, Novelty: A. Video Streamed Lectures & Expert Commenting

## 5. Autonomy, Choice: a. Clickers; Innovation is but one click

**Interactive teaching engages learners**  
From eSchool News staff and wire service reports  
May 11, 2005

A wireless handheld technology similar to the remote control you use to control your television set is transforming large, impersonal college lecture courses into dynamic, interactive learning labs. Although initiated mostly in colleges, the style of instruction—dubbed “interactive teaching” by its proponents—has potential far beyond the lecture hall.

In a recent “Ethics and Public Policy” class, Brown University professor Ross Chert used the students if they had a moral obligation to report cheating if they knew about it.

The room began to hum, but no one called out an answer or raised a hand. Still, in 90 seconds, Chert had roughly 150 student responses displayed on an overhead screen, plotted as a multicolored bar graph—64 percent, yes, 35 percent, no.

## 5. Autonomy, Choice: A. Multiple Topics

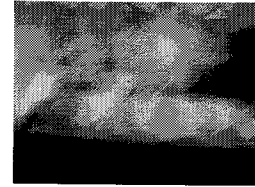
Topic	Unread	Total	Status
1. Tech Invention, Review	0	415	public, unlocked
2. Thoughtful Reflection	0	1	public, unlocked
3. Five Top Reasons to Discontinue	0	93	public, unlocked
4. Research Review of Superheroes	0	65	public, unlocked
5. Class Party or Bookings	0	36	public, unlocked
6. Curriculum Presentation	0	0	public, unlocked
7. Review Class Superheroes or Participation	0	0	public, unlocked
8. Generate Debate	0	0	public, unlocked
9. Research Superheroes	0	31	public, unlocked
10. Expert Reviews	0	0	public, unlocked
11. Complete Final Discussion	0	134	public, unlocked

## 10. Yields Products: Concept Maps, Video Papers, Virtual Timelines, Digital Movies

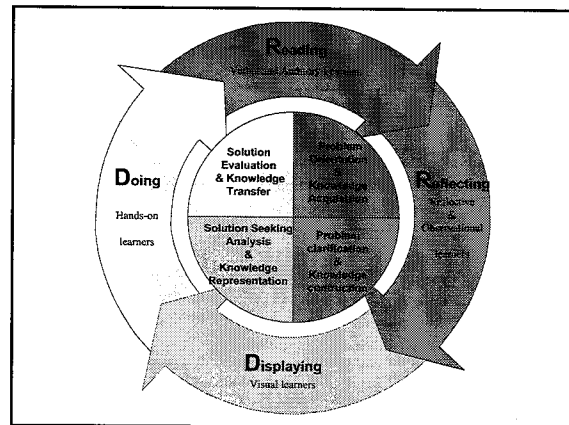


## 99 seconds: What have you learned so far?

- Solid and Fuzzy in groups of two to four



## Addressing Learning Styles With Technology



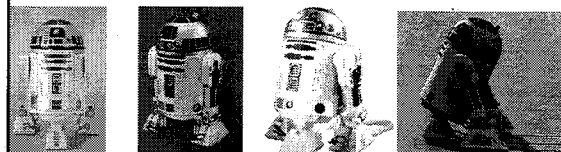
## 1. Auditory or Verbal Learners

- Auditory and verbal learners prefer words, spoken or written explanations.



## The R2D2 Method

1. Read (Auditory and Verbal Learners)
2. Reflect (Reflective Learners)
3. Display (Visual Learners)
4. Do (Tactile, Kinesthetic, Exploratory Learners)



## 1a. Art and History Exhibits

Diablo Artus Revelations  
 Connect  
 Join

## 1b. Basic Acoustics of Musical Instruments

### 2005 MERLOT Classics Award

**Spectra of Brass Instruments.**

When the player and instrument are playing a particular note, the lips are vibrating at one particular frequency. But, regardless of the vibration frequency, as air waves playing freely, a pressure maximum is the result from "what is a sound spectrum?" These harmonics in the lip vibrations set up, and are usually in phase reinforced by, standing waves. Because the instrument is designed to produce standing waves with harmonic frequency ratios. Let's listen to a clarinet solo played on a modern B♭ trumpet, and look at the spectra.

The three individual spectra are for the lowest note played (lowest C) sounding B♭, and the notes one and two octaves higher. The fourth spectrum is the average over time for the whole solo. Why do the spectra have their characteristic shapes?

In all wind instruments, the higher frequency harmonics are relatively significant because they have energy as virtual losses -- a sort of friction with the walls, so the spectra is rich for these at high frequencies. However, for brass instruments, the relative power spectrum increases with frequency over the low part of the range, as here. This means that one tends to get maximum radiance at a moderate-high frequency. One can avoid several hundred Hz, although it has a different value in each lip used instrument, and less power at lower and higher. Further, the radiance is in the complex and the complex 2 report it also tend to show the lip to not efficiently over the frequency. Further contributing to the point.

## 2. Reflective and Observational Learners

- Reflective and observational learners prefer to reflect, observe, view, and watch learning; they make careful judgments and view things from different perspectives

## 2a. Reuse Web Activities and Transcripts

45. Real-time Chat is Enabled...And also More Async Questions for Bob, Erping, Julia, John, or Kira or anyone else.

Chat Room Started on 11/05/01 07:14 PM  
 Modified by Chao-Hong Wang on 11/05/01 07:57 PM

Ok, chat and more Chapter 8, 9, or 10 questions here. Bob, John, Erping, Kira, Julia, and others might reply. Thanks

- Click the name for chat transcript
- View the chat transcript ordered by name
- View the chat transcript ordered by thread

## 2b. Online Professional Development (E-Reading First Ohio)

(reflect, share, and compare)

TEACH ONLINE

Read for Me, Youth Connection with the ability to identify where your first step in the future. You can see the video for yourself or download it to your computer. You can also download it to your computer.

1. What happens in the video?  
 2. How does the video help others learn?  
 3. What does the video teach?  
 4. What does the video do to help others learn?

## 3. Visual Learners

- Visual learners prefer diagrams, flowcharts, timelines, pictures, films, and demonstrations.

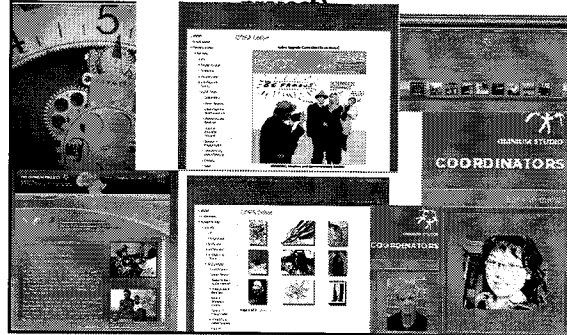
Death Star II

Location: Death Star II  
 Location: Death Star II  
 Location: Death Star II  
 Location: Death Star II  
 Location: Death Star II

**3a. Adventure Blogging = Reality Teaching and Learning (and Virtual Tours)**  
 (Ben Saunders, Andrew Revkin (NY Times), Mark Fennell)

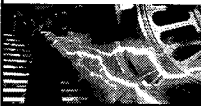


**Design (COFA Online, Omnium Project, Creative Waves—online graphics and photomedia)**

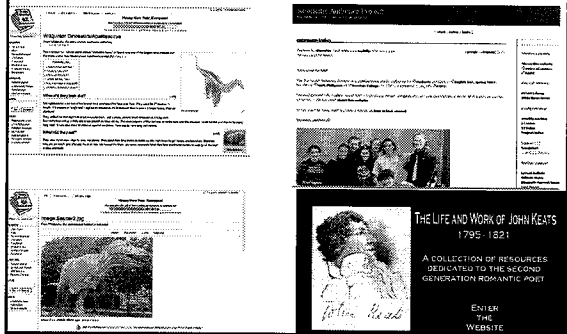


**4. Tactile/Kinesthetic Learners**

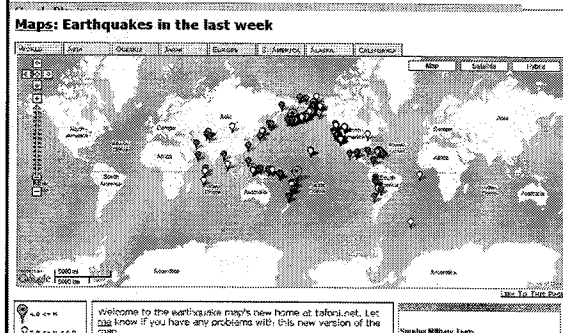
- Tactile/kinesthetic senses can be engaged in the learning process are role play, dramatization, cooperative games, simulations, creative movement and dance, multi-sensory activities, manipulatives and hands-on projects.



**4a. Wikis: Junior Wikibooks (Dinosaurs) and Romantic Poetry**  
[http://en.wikibooks.org/wiki/Main\\_Page](http://en.wikibooks.org/wiki/Main_Page)



**4b. Electronic Cameras and Maps**



**Next up: The MATRIX!!!!!!!!!!!!!!**

- Mobile
- Auditory
- Thought-stimulating
- Reflective/Real-World
- Visually Interactive
- Extremely Hands-on





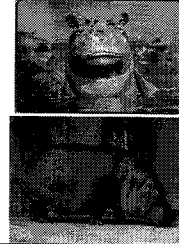
It is both Nature AND Nurture as well as PEOPLE!!!  
Technology is just part of the Equation

Sample papers at: <http://www.publicationshare.com/>  
Archived talks at: <http://www.trainingshare.com/>

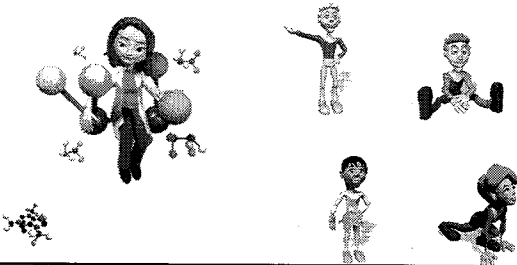
**The Learning World Really is Flat**



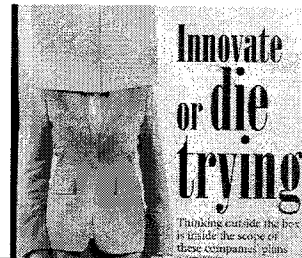
Now for the big questions...!!!  
**99 Second Reflection!!! Jot down 3 things you learned.**



Now for 2 Minutes: Share your ideas with someone next to you and agree on three things maximum per category.



**Let's Think Outside the Box!**  
For 4 minutes share your ideas with another pair and agree on 3 things/category.



**3** Stop and Share for 6 minutes: Share at your table! **3**



**Predictions of Digital Literacy Skills Needed in 21<sup>st</sup> Century**

