Preparing for the Changing Role of Instructional Technologies in Educating Health Science Professionals

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Converging Trends

1. Explosion of New Information
2. All Information Digital
3. A New Generations of Learners
4. New Instructional Technologies
5. Accelerating Pace of Change

Health Science Education 2010
The Problem with Predictions: Visions of the Future Were Often Based on the Past

http://www.lessons-from-history.com/node/32
The View from 1956

- 1956 New York Times article on new plans from the Hamilton Watch Company:

  “A revolution is coming to the ancient art of timekeeping, specifically in the design of watches. It is being sparked by new discoveries in electronics and advances in miniaturization and it will take two forms.Scheduled for the immediate future, is the electric watch, no bigger than the one you are wearing, which will run entirely on the current from a battery.

- In the more distant future, say 1975, is an “atomic” wrist watch, a time piece operated by a midget nuclear power plant.”
The Trends

• Trend 1: Explosion of New Information
• Trend 2: All Information Becoming Digital
• Trend 3: A Generation of New Learners
• Trend 4: New Instructional Technologies
  (Interactive, Media-Rich, Often Free, Shareable: Web 2.0)
• Trend 5: An Accelerating Pace of Change
Some estimates suggest that by 2015, the doubling rate will be every 35 days

Cornall R., Speech at Queensland University of Technology Faculty of Law Graduation Ceremony, 2008.
The Trends

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• Trend 5: An Accelerating Pace of Change
Trend 2: All Information Becoming Digital

Find Patients Just Like You

Do you have a life-changing condition? Learn from the real-world experiences of other patients like you.

Join Now! (It’s free!)

See how PatientsLikeMe can help you take control of your health:

- Share your health profile
- Find patients like you
- Learn from others

"...one of the things I love about PatientsLikeMe, is their symptom-tracking feature. Because I won’t, you know, consiously lie to my doctor. But am I gonna remember every little symptom I had over the three months since I’ve last seen him? Not a chance..."

—HIV Community Member
Seeking for Health Information Online

• 8 in 10 Internet users, or about two-thirds of U.S. adults, look online for health information.

• Pew Internet & American Life Project estimates that 61% of American adults surf the Web for health information, with many looking for user-generated content written by others with similar medical conditions.

Data source: 2009 Pew Internet & American Life Project
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Trend 3: A Generation of New Learners

What will medical students be like in 2020?
The Future?

information behaviour of the researcher of the future
11 January 2008
A Generation New of Learners

A 25 year old in 2020:

• was born into a digital world: 1995, the year the Web became mainstream
• used a computer before starting kindergarten
• will use words not yet created
• **will use technology no one has predicted**
Digital Natives

- Today’s students have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age.

- Today’s average college grads have spent less than 5,000 hours of their lives reading, but over 10,000 hours playing video games (not to mention 20,000 hours watching TV).

Marc Prensky *Digital Natives, Digital Immigrants*  
From *On the Horizon* (MCB University Press, Vol. 9 No. 5, October 2001)
Digital Natives/Immigrants/Settlers

- **Digital Natives** – grew up with technology; have always lived with computers, the Internet & cell phones

- **Digital Immigrants** – grew up without technology and adopted it later; speak with “a technology accent”

- **Digital Settlers** - those who were not Born Digital but Live Digital
89% of Young Adults Watch and Share Online Videos* 

*Pew Internet & American Life Project, July 2009 

YouTube Facts & Figures, 2010 
YouTube Can Reach Learners in New Ways
71% of 12–17 year Olds Use Mobile Phones*

*As of early 2008, According to the Pew Internet & American Life Project
As of September 2009, according to the Pew Internet & American Life Project, 82% of 14–17 year olds use online social networks.

Facebook takes over the world

As of July 15, 2009, Facebook has a total of 250 million users worldwide. If it were a country, that would make Facebook the 4th most populous country in the world.

1. China: 1,332,060,000
2. India: 1,166,900,000
4. Facebook: 250,000,000
5. Indonesia: 230,781,846
6. Brazil: 191,594,000
7. Pakistan: 167,021,500
8. Bangladesh: 162,221,000
9. Nigeria: 154,729,000
10. Russia: 141,868,000

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Trend 4: New Instructional Technologies

- Telephones became Smart
- Cameras became Digital
- Printed Material: Books, Newspapers, Magazines are Read on a Screen
- Television is Recorded to be Watched Later
- Movies are Rented and Owned
- Music is Shared/Streamed/Stolen
- Information is Easier/Harder to Decipher
Digital Natives and New Technologies

- log onto the high-speed network on their laptop using a wireless connection
- Use *Instant Messaging* or *Twitter* to talk online with their friends
- after *Googling* their research topic and checking *Wikipedia*… write a research paper
- then create a *Slide.com* presentation to show as a visual narrative in class the next day
- download and share MP3 files, burn music CDs (and possibly violate some copyright laws)
- turn on their *iPods* to listen to books, lectures or broadcasts they missed
- get their daily *news online*
- pick up their *digital camera*, make a video, use their computer to edit the footage and then put it up on *YouTube*
- update their *Facebook* page, see who has written on their wall
- check favorite blogs or create a *blog* themselves, using free internet hosting sites
- add images to their *Flickr* accounts
- set up a *wiki* for a class so they can share the same facts and data with other students
- spend some time *gaming*… *XBox*, *Wii*, *Playstation*
What is Web 2.0?

- Different from traditional websites, retroactively labelled Web 1.0.
- Designed to deliver interactive, versus static, applications to end-users. Content is characterised by open communication, decentralised authority, and freedom to share and re-use materials across a more dynamic, interlinked and interactive World Wide Web.
- Often referred to as 'read/write web' applications.
Web 2.0: AKA the Read/Write Web

Easy to use Web-based Applications
- Often free
- Collaborative
- Social
- Shift away from traditional Web publishing toward user-generated content and open access

Popular Web 2.0 Tools include:
- Blogs
- Podcasts
- Social Networks
- Social Bookmarks
- Personal Wikis
- Virtual Worlds
- And an ever growing list of Web-based resources
CREATING

EVALUATING

ANALYZING

APPLYING

UNDERSTANDING

REMEMBERING

2009 M. Fisher; http://mikefisher.pbworks.com

http://visualblooms.wikispaces.com/
The Trends

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Trend 5: An Accelerating Pace of Change

Converting Body Movements Into Electricity
By HENRY FOUNTAIN
Published: February 26, 2010

It may not seem like a human dynamic air into the lungs and the aorta, and if the process is not across the results Unproven, Robotic Surgery Wins

Moving Mountains With the Brain Practicing on Patients, Real and Otherwise

Near the end of my surgical training, I was a resident of a hospital, and I learned that

E-Health
An iPhone App That Could Change Medicine
Camilla Webster, 11.16.09, 06:20 PM EST

Allscripts Remote lets doctors access real-time patient data and e-mail prescriptions to pharmacies.

Forbes VIDEO NETWORK
An Accelerating Pace of Change

The computer in your cell phone or other digital device today is a million times cheaper and a thousand times more powerful and about a hundred thousand times smaller (than the one computer at MIT in 1965).
Imagine.....2025

• “…we are entering a world in which a worldwide Internet based system of knowledge provided in real time and mediated by expert systems exploring massive databases will be useful tools for healthcare and research.”

• “Learning resources will be online, 24-7 and pulled forward on demand by the professional who needs it. An integrated model of learning will support all professionals and include an ascending series of complexities in language so individuals and their families can use the basic level while very sophisticated advanced specialists use the most complex layer… These resources will also be accessible over the network for use in K-12 education…[This] will prepare consumers to be active participants in decisions about their care and prepare people coming into health education programs for more effective approaches to learning.”

Visions of the National Library of Medicine in 2025
So, How Can We Prepare for the Changing Role of Instructional Technologies in Educating Health Science Professionals?

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Master’s of Education in Teaching with an Emphasis in the Health Sciences

A graduate medical education program for healthcare professionals

http://medical.coe.uh.edu
The University of Houston offers a Master's degree in Teaching on the campus of the Texas Medical Center. The 36-semester hour program focuses on training health professionals to become better educators.

Courses are taught by University of Houston College of Education faculty and the degree is awarded by the University of Houston. If you would like more information about the program, please contact Bernard Robin, Ph.D., program coordinator, at: brobin@uh.edu

Quick Links about the Program

- Welcome Message:
- Frequently Asked Questions
- Information for New Students
- This Semester's Courses
- University of Houston Academic Calendar
- Meet the Faculty

Applications for Spring 2011 are due on October 1, 2010. For international applicants, the deadline is August 1, 2010. Click here for more information

http://medical.coe.uh.edu/
Course Requirements:

12 Courses (36 Semester Hours) Required for a Master’s Degree

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<th>Foundations of Education Courses</th>
<th>Instructional Studies &amp; Teacher Education Program Area Courses</th>
<th>Approved Elective Courses</th>
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<td>2. Instructional Design</td>
<td>2. Issues in Distance Education</td>
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<tr>
<td></td>
<td>4. Integrating Technology in the Curriculum</td>
<td>4. Survey Design</td>
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<td>5. Advanced Digital Imaging for Medical Educators</td>
<td>5. Advanced Internship</td>
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<tr>
<td></td>
<td>6. Research in Curriculum &amp; Instruction</td>
<td></td>
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<td></td>
<td>7. Design of Online Educational Resources I</td>
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Two Program Tracks:

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<th>Master’s Thesis Option:</th>
<th>Non-Thesis Option:</th>
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<tbody>
<tr>
<td>10 Courses</td>
<td>12 Courses</td>
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<tr>
<td>+ 2 Thesis courses</td>
<td>+ A Written Comprehensive Exam</td>
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<tr>
<td>+ A Written Master’s Thesis</td>
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2 Courses are Offered in the Medical Center Each Semester (Fall, Spring, Summer)

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<th>Year One</th>
<th>Year Two</th>
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<td>2 courses in the Fall</td>
<td>2 courses in the Fall</td>
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<td>2 courses in the Spring</td>
<td>2 courses in the Spring</td>
</tr>
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<td>2 courses in the Summer</td>
<td>2 courses in the Summer</td>
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Classes:

- usually meet one evening per week
- from 5:00 to 8:00 pm
- at Baylor College of Medicine and the University of Texas Health Science Center
Linked Courses (offered in most semesters):

- Content of one course complements content of the other course
- Students are required to enroll in both courses and earn 6 hours of credit for the two courses
- 2 courses are taught collaboratively by two different instructors
- Assignments and final semester projects for the two courses are linked so the work done for one course is connected to the work done for the other course
## Linked Course Pairings

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<th>Principles of Human Learning linked with Models of Teaching</th>
<th>Integrating Technology in the Curriculum linked with Courseware &amp; Presentation Tools</th>
<th>Intro to Educational/ Psychological Measurement linked with Instructional Evaluation</th>
<th>Instructional Design linked with Design of Online Educational Resources I</th>
<th>Issues in Distance Education linked with Design of Online Educational Resources II</th>
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Web 2.0 Communication Tools

1 WAY
- PODCAST

2 WAYS
- EMAIL
- BLOGS

MULTIPLE WAYS
- MOODLE
- GOOGLE WAVE
- CHAT
- jabify
Web 2.0 Tools for Presentation and Collaboration

1 WAY
- SLIDESHAPE
- DE.LI.CIOUS
- PREZI

2 WAYS
- YouTube

MULTIPLE WAYS
- DIIGO
- Google Docs
- Glogster
- Google Groups
- PBworks WIKI
Web 2.0 Tools for Reflection & Feedback

- Survey Monkey
- Twitter Poll
- Google Groups
- Ning
- Wordle
- Aviary
- Voicethread

1 Way
2 Ways
Multiple Ways
A Few Student Examples:
Online Vocabulary Analysis

VocabGrabber
A Few Student Examples: Online Vocabulary Analysis

VocabGrabber would be a great tool for the novice to medicine who is trying to make headway through a highly intellectual article, or one that has nothing to do with their field of expertise.

I would use this when I have medical students or residents critique an article. This innovative tool allows you to copy and paste electronically available text directly onto its website and it will define all the words in your text for you.

Medical, biological, and anatomical terms are also easily defined. Vocabgrabber will also generate synonyms and antonyms for each word. This makes for more connection between what is being read and what is already known.

VocabGrabber
A Few Student Examples:
Online Flowcharting

Creately
A Few Student Examples: Online Avatars

Xtranormal
Step 1: FIND a Research Study Related to the Weekly Module Category
Students will find a relevant research study, journal article, or other related resource that is connected to the weekly module's category. The research findings should describe any aspect of how these topics were used to support an instructional goal. We have created a Research Studies in Distance Education web page that contains some studies and we will continue to update this page throughout the course. You may also search for other research findings that are related to your own area of interest and use those if you prefer.

Step 2: IDENTIFY Meaningful/Replicable Elements in the Study
Students should find elements within the study they reviewed that they could use in their own proposed study. For example, there are many research studies on the effectiveness of podcasting in education, which would fall under Module 1: Communication. Students could determine if the methodology or analysis procedure used in this study could be replicated in their own field.
Step 3: CREATE a Mini-Research Proposal of Your Own

Students will develop a plan for a possible research study based on the topic of the weekly module that also includes the use of a Web 2.0 tool or resource. An actual research study DOES NOT need to be conducted for this course, but the plan for such a study should be described in three to five paragraphs.

Students should answer the following questions in their mini-research proposal:

- Why is the study important?
- Who are the subjects/participants of the proposed study?
- What is the basic research question?
- Where would the study be conducted?
- What is the time frame of the study?
- What type of data would be collected?
- How the data would be analyzed?
- What study was the inspiration for this study? (Please cite author, title, where it was published, and the URL)
Research + Practice

- **Step 4: SHARE your Mini-Research Proposal**
  Students should try to post their mini-research proposal on the Moodle discussion forum early in the week, leaving time for other students and the instructors to post their own comments and participate in an online discussion.

- **Step 5: COMMENT on Other Students' Plans**
  As mentioned above, students should also review the postings of other students and post questions or comments about the proposed research studies during each week's discussion period.
Description: I would like to design a study around creating a wiki for use in residency education as a collaboratively written tool by upper level residents and faculty to share their collective knowledge and educational resources with lower level residents.

Importance of Study: This study would provide insight into the effectiveness of the wiki to provide resources and information in one place to enhance lower-level practice-based learning and encourage reading and research.

Participants: Lower-level residents (PGY 1 and 2) are the learners. Faculty and upper level residents would contribute information and resources.

Research Question: Will the wiki enhance practice-based learning and encourage more reading and research by lower-level residents?

Timeframe: At least 2 full academic years.

Data Collection/Analysis: Data would be collected through an opinion-based survey and direct observation documented through faculty and resident evaluations.

**Description:** I am designing a study utilizing videoconferencing (i.e. Skype) in teaching PALS (Pediatric Advance Life Support) to medical providers in developing countries.

**Importance of Study:** The need for medical education in developing countries is crucial and often insufficient. My goal is to teach providers basic pediatric life support so they can provide life-saving measures for the pediatric population.

**Participants:** Doctors and nurses from an underserved community in India will be educated with the PALS curriculum via Skype by certified PALS instructors from Texas Children’s Hospital in Houston. The providers abroad will intervene in resuscitations and codes for pediatric patients in the community.

**Research Question:** Does PALS training for medical providers in an underserved community change the morbidity and mortality of the pediatric population in that area?
Videoconferencing to Teach PALS

**Where and When:** Village in Kolkata, India; 12 months (including 6 months of training with videoconferencing that includes didactic sessions, workshops, and certification via Skype)

- **Data Collection/Analysis:** 6 months of data collection of resuscitations and codes that occur in the village pre-training (while the initial education is going on) and 6 months of data collection of resuscitation and codes that occur post-training
- All local medical providers, clinics, and hospitals involved with the project will be asked to keep records of resuscitations and codes that occur in the area.

Pre and post-training events will be analyzed; both the actual number of events and results of the events will be reviewed to see if implementation of the PALS curriculum was a helpful intervention. If so, the study could be utilized in training medical providers in underserved villages in other developing countries.

  - Essential emergency surgical, procedures in resource-limited facilities: a WHO workshop in Mongolia.
  - Cherian MN, Noel L, Buyanjargal Y, Salik G.
  - PMID: 15751550 [PubMed - indexed for MEDLINE]
Moodle for Med Students

**Description:** I am designing a study utilizing Moodle for medical students to post discussion topics that they would like to go over in the surgery clerkship or for them to have a forum to discuss amongst themselves issues that arise during the clerkship.

**Importance of Study:** The study is important to determine if such a site would prove useful for medical education. There are not currently any such sites in practice at UT Medical School at Houston. It would likely improve communication between the students and faculty in the surgery department.

**Participants:** The participants would be the 3rd year medical students who rotate on the Surgery clerkship every 8 weeks. There are approximately 40 students per rotation. In addition, the clerkship director and site coordinators would serve as the faculty moderators for the site.

**Research Question:** The basic question is “Can a communication website for discussion forums improve the medical student experience and education while on the surgery rotation?”
Moodle for Med Students

**Where/When:** The study would be conducted at the UT Medical School at Houston. The students would be able to access the site at the medical school, in the hospitals where they are rotating, or at home. The time frame would be 12 months (6 rotations).

**Data Collection/Analysis:** A questionnaire would be used at the end of the 8-week period to access the students’ use of the website and their perception of how it worked. They would be able to compare the rotation to their other clinical rotations (Medicine, Pediatrics, Ob/Gyn, etc) where they are not using such a website and discuss whether they felt it improved their experience. The questions would be on a Likert scale of 1-5. The students score on the surgery exam would also be collected. The data would be analyzed for the responses to the questionnaire. In addition, the scores of the students would be compared to the scores of the previous years’ students.

Information Seeking & Medical Education

Survey of Young Physicians... Seeking Medical Information:

- 80% use Google
- 70% use Wikipedia

Despite awareness of information credibility risks with Web 2.0 content, it has a role in information seeking for both clinical decisions and medical education. This is enabled by the ability to cross check information and the diverse needs for background and non-verified information.


http://www.sciencedirect.com/science?_ob=MImg&_imagekey=B6T7S-4WFPPNB-1-78_cdi=50668_user=25022478_pi=13865056090007568_orig=search&coverDate=10%2F31%2F2009&sk=999219989&view=c&wchp=dGLbVz-zSkzS&md5=077044d7f65afe996680301525c6e3b&ie=/sdarticle.pdf
Information Seeking & Medical Education

Survey of Young Physicians... Seeking Medical Information:

**Conclusion:** Web 2.0 use represents a profound departure from previous learning and decision processes which were normally controlled by senior medical staff or medical schools. There is widespread concern with the risk of poor quality information with Web 2.0 use, and the manner in which physicians are using it suggest effective use derives from the mitigating actions by the individual physician. Three alternative policy options are identified to manage this risk and improve efficiency in Web 2.0’s use.

- 1. basic training on the use of diverse online sources
- 2. additional tools that raise physicians’ awareness of the availability and credibility of internet content
- 3. new content tools such wikis specifically aimed at target groups of physicians demarcated by geography or practice type

Questions & Recommendations

• What technology skills do academic healthcare professionals need to know to meet the needs of current students and those they will educate in the future?
• How will academic healthcare professionals learn these technology skills?
• How can sustained support be provided to faculty so that they continue to learn about and use new technologies as they become available?
Recommendations

• Faculty should use technology to provide experiences for learners not otherwise possible—not as a replacement for face-to-face experiences, but as a supplement to them.

The advantage of newer technologies is not because they improve learning per se, but because they can enable learning in situations that would otherwise be difficult. For example, Internet-based technologies can be used to overcome barriers to learning such as time and distance, individualize instruction, and manage information. Technology-enhanced simulation can facilitate deliberate and repeated practice, team training, and permit practice of clinical problems that are rare or expose patients to unnecessary risks.

Often, the most effective instructional designs involve a combination of traditional and technology-enhanced methods.
Recommendations

• Because technologies evolve rapidly, faculty members should focus on fundamental principles of teaching and learning rather than learning specific technologies in isolation.

Rather than try to stay abreast of the latest technology, educators should focus first on the learner needs and course objectives. They should then select an instructional approach to meet these needs and objectives, using technology to support this approach. "Technology" thus assumes its appropriate role as a toolbox from which the appropriate tools can be selected, depending on the needs at hand.
Recommendations

• *Academic Health Centers should allocate a variety of resources to support the appropriate use of instructional technologies.*

These resources should include:
- a team-based development model;
- adequate time to learn to create curricular materials enhanced with technology; and
- suitable software and hardware. Faculty members should be content experts and not necessarily technology experts. Teams composed of e-learning specialists, Web designers, and videographers can support development of new curricula while guiding faculty in the use of new technologies.
Recommendations

• **Academic health centers should support faculty members as they adopt new technologies.**

Faculty who effectively use these new technologies should be acknowledged and rewarded as part of academic scholarship. Course development grants as well as adequate time to learn new technologies are necessary if faculty members are to adopt new ways of teaching.
Recommendations

• National organizations should provide funding and leadership to enhance a national/global infrastructure to foster collaboration in order to share resources and instructional ideas in medical education.

Effective curricular innovations should be disseminated nationally and internationally. National organizations should provide funding and leadership to enhance a national/global infrastructure that can share resources and instructional ideas in medical education. Electronic resources should be used to share innovations, best practices, and implementation plans for the use of instructional technologies as well as to provide specific curricula and instructional ideas in a central, easily accessed repository.
Academic Challenges

• The enthusiastic academics will be:
  – encouraged by new technologies, and
  – will want to learn more & try new methods

• However, some academics:
  – are comfortable with their traditional way of teaching & won’t want to change
  – may feel threatened by new technologies
  – won't like wireless Internet in lecture halls, students using laptops, emailing, chatting, Googling answers…
  – Some will even ask that technology be removed from classrooms!
So, where are **YOU** in relation to using **21st century technologies** for instruction?
University of Houston Master’s of Education Program in Teaching with an Emphasis in the Health Sciences

http://medical.coe.uh.edu/

Slides online at:
http://faculty.coe.uh.edu/brobin/tamu/prepare.pdf