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# Technology in Education: Strange Bedfellows or a Match Made in Heaven?

Catherine R Lucey MD
Professor of Medicine
Vice Dean for Education
UCSF School of Medicine

# Disclaimers

About me:

Educator and Internist, Not a Techie

About Topic:

Not about use of technology in clinical environment

# Technology Aphorisms

**Access to Information ≠ Learning of information**

- The internet is no substitute for a brain

**Bad Pedagogy + Technology ≠ Good Pedagogy**

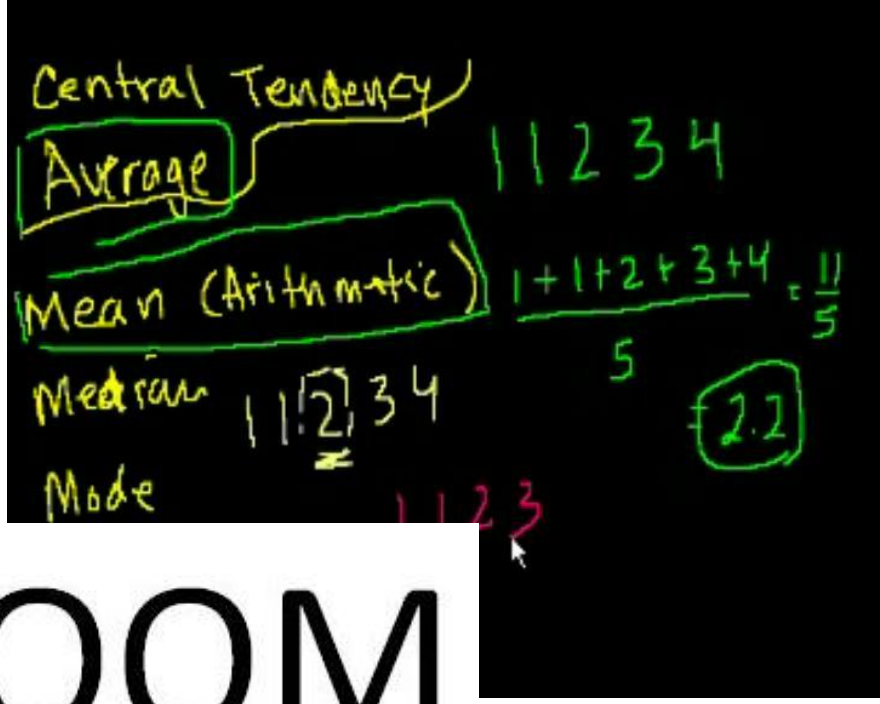
- A lecture by any other name is still a lecture.

**Good Teaching requires Good Teachers**

- Even when technology is involved.

# EDUCATIONAL TECHNOLOGY: THE HYPE

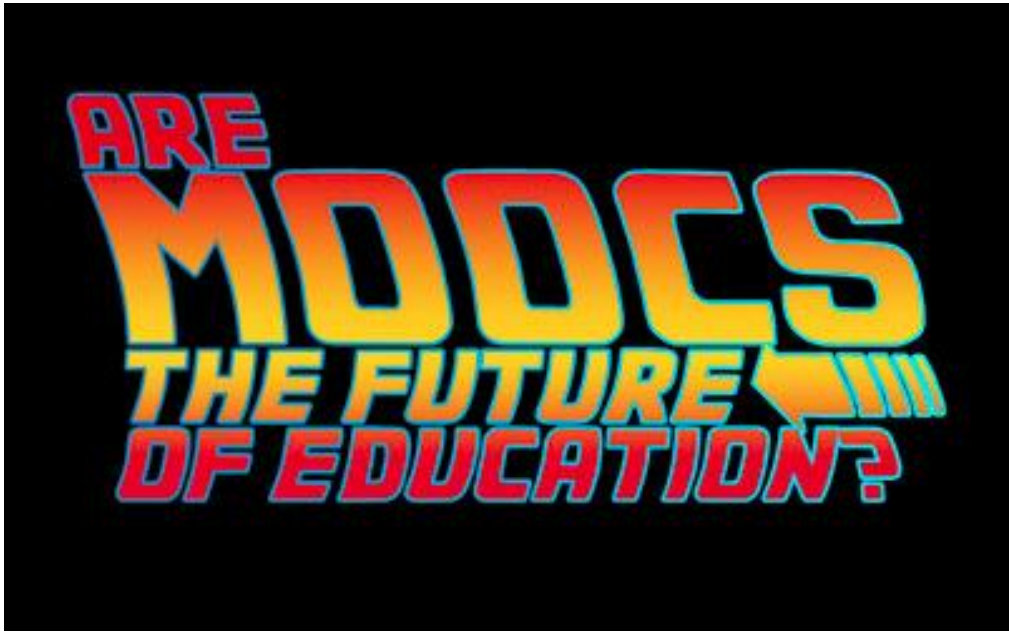
KHAN ACADEMY




# FLIPPED CLASS ROOM

by viaAcademies

UDACITY




coursera

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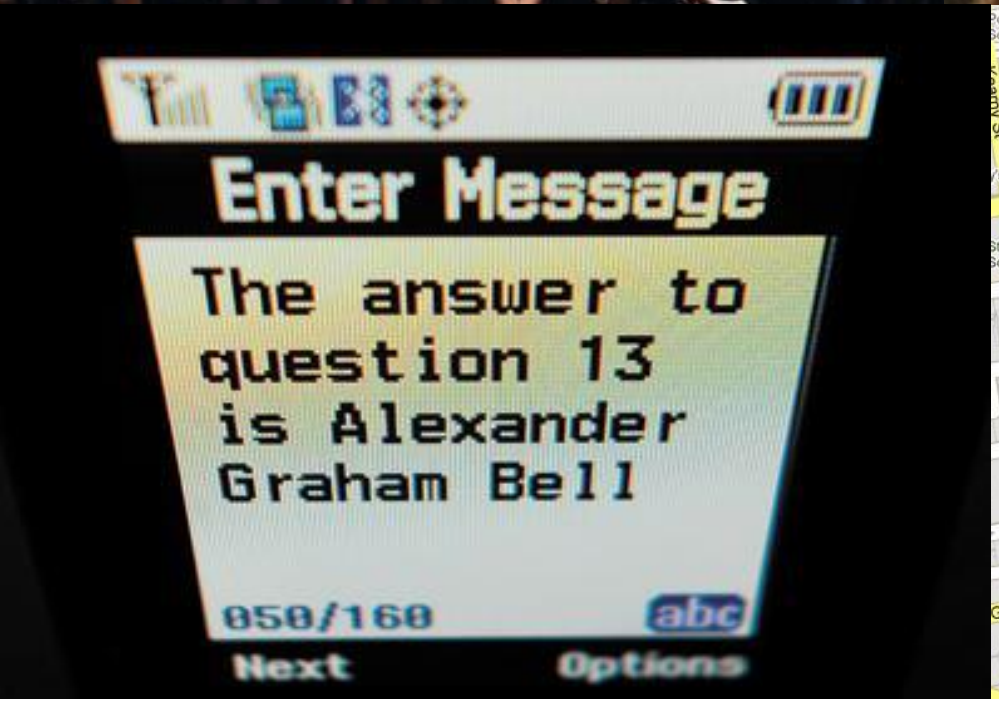
# TECHNOLOGY AND EDUCATION: THE HORROR


WARNING
To meet a deadline, this article was plagiarised from another news source.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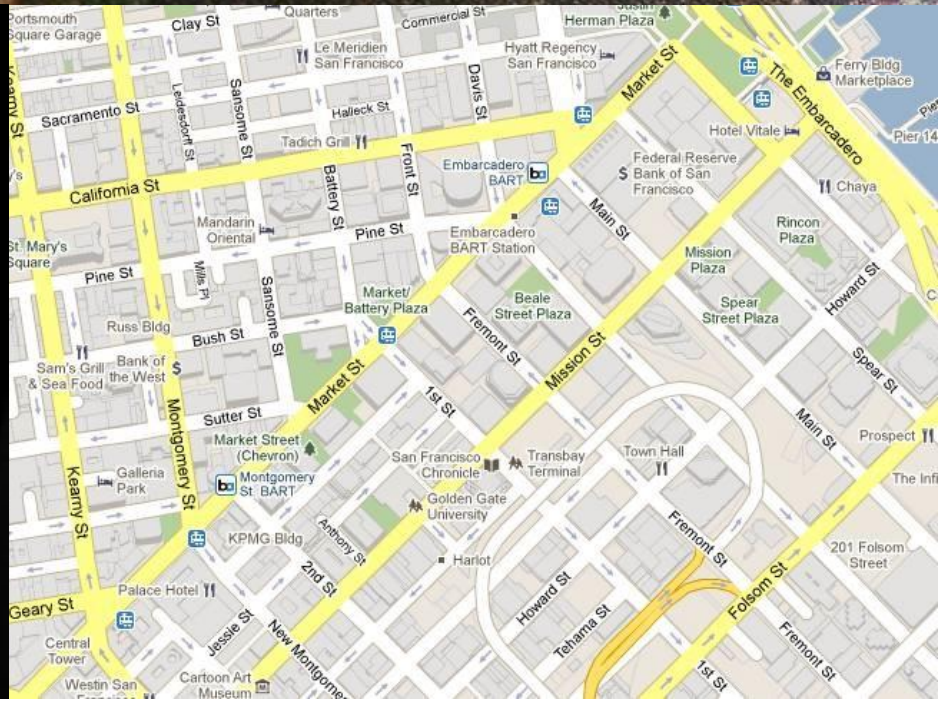
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Davis St
Sansome St
Leidesdorff St
Tadich Grill
Hotel Vitale
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Chaya
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Battery St
Front St
Embarcadero BART
Mandarin Oriental
Pine St
Embarcadero BART Station
Main St
Rincon Plaza
Mission Plaza
St Mary's Square
Mills Pl
Market/ Battery Plaza
Beale Street Plaza
Spear Street Plaza
Howard St
Russ Bldg
Bush St
Fremont St
Mission St
Sam's Grill & Sea Food
Bank of the West
Sutter St
1st St
Spear St
Market Street (Chevron)
San Francisco Chronicle
Transbay Terminal
Town Hall
Prospect
Main St
Kearny St
Montgomery St
Galleria Park
Montgomery St BART
Golden Gate University
KPMG Bldg
Anthony St
Harlot
Fremont St
201 Folsom Street
2nd St
Palace Hotel
Howard St
Folsom St
Geary St
Jessie St
Tehama St
Central Tower
Cartoon Art Museum
1st St
Fremont St

# Technology Changing How Students Learn, Teachers Say


Nancy Palmieri for The New York Times

Lisa Baldwin, a chemistry teacher, works with her students to fight through academic challenges.

By MATT RICHTEL
Published: November 1, 2012

# EDUCATIONAL TECHNOLOGY: THE HOPE

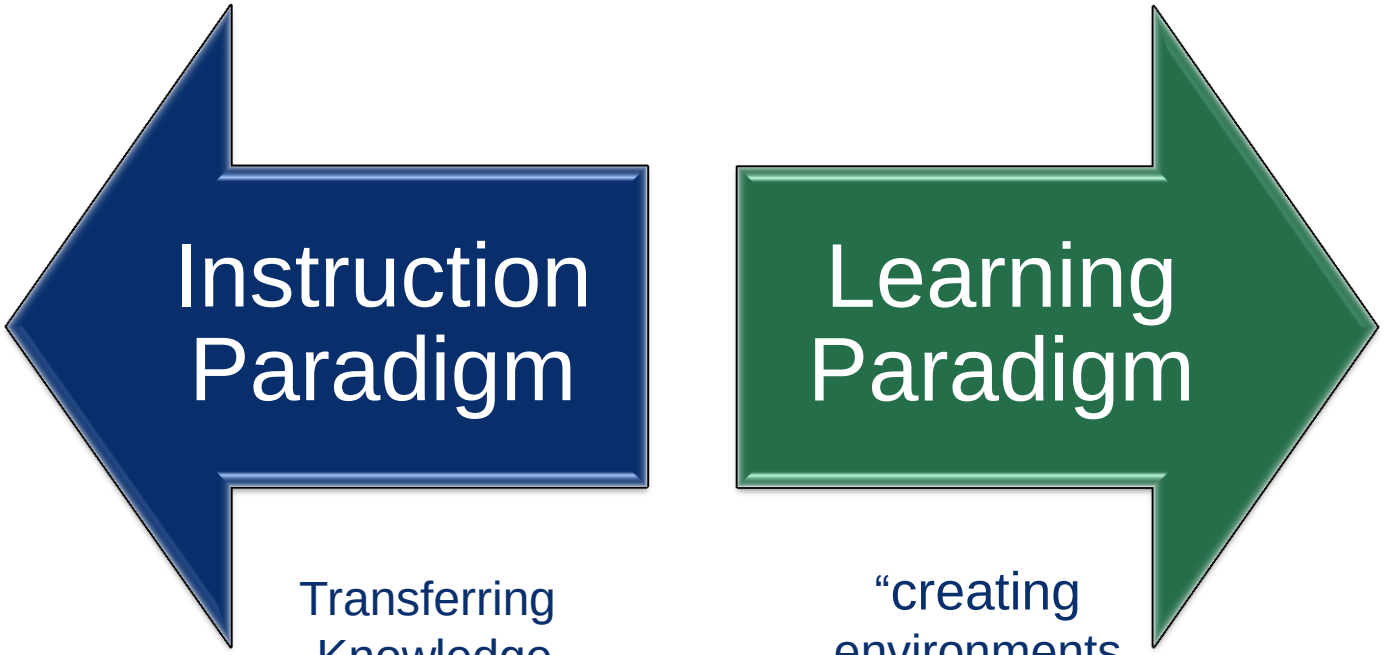
# Educational Technology will…

…enhance learning

…democratize higher education

…decrease educational costs

# 20th Century Paradigm Shift

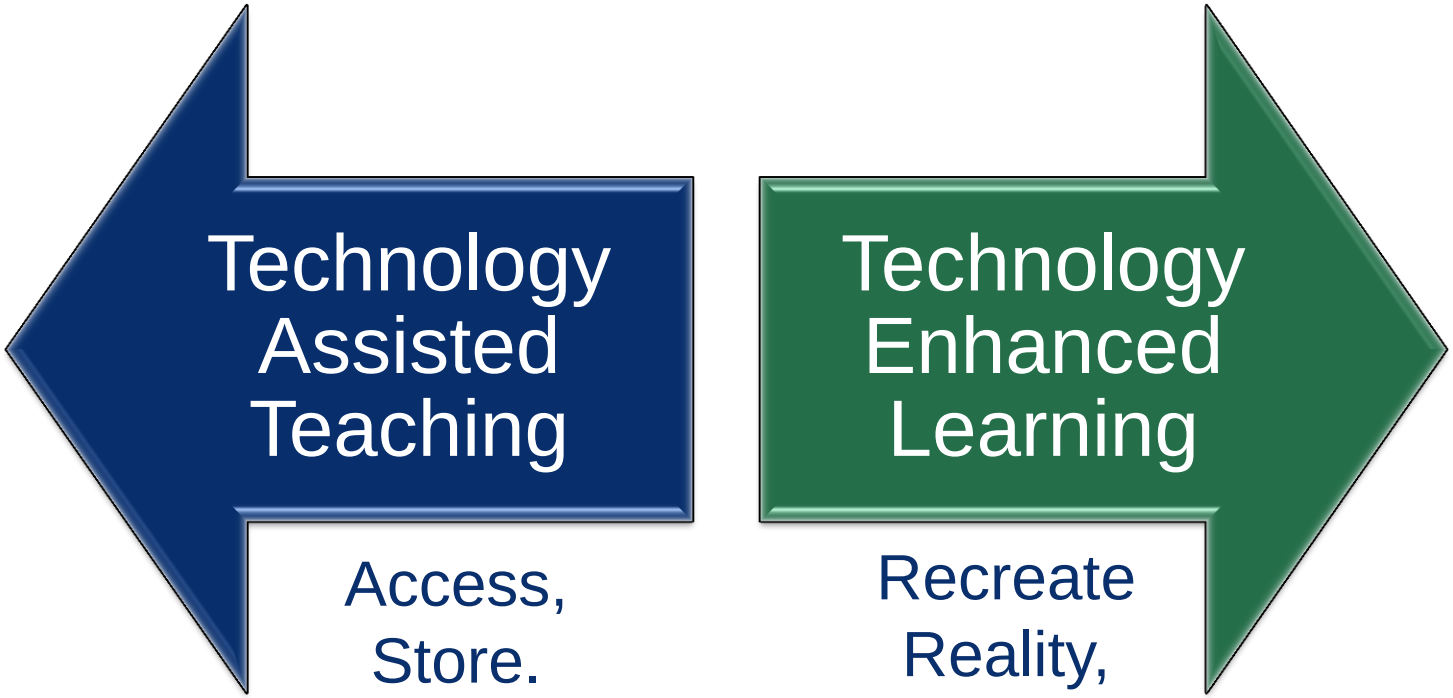



Transferring Knowledge From Faculty to Student

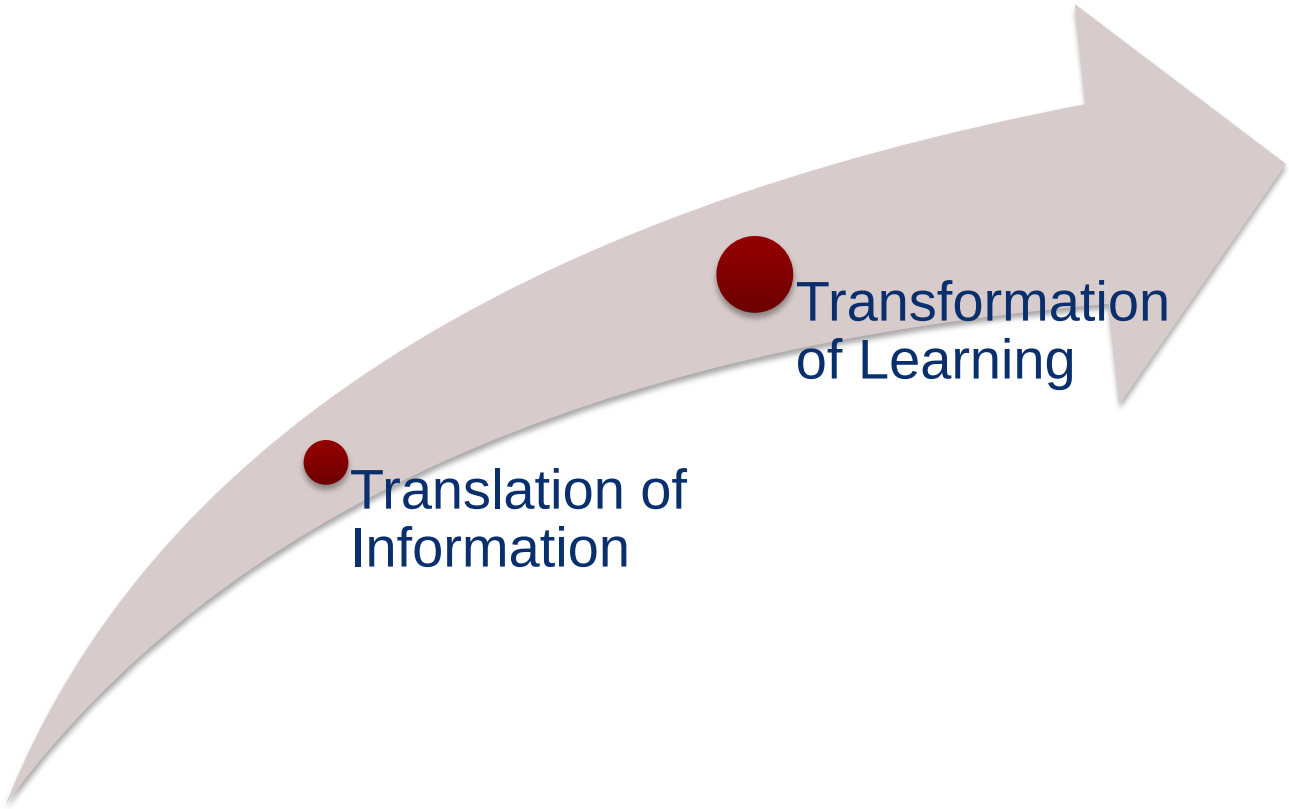
"creating environments and experiences that bring students to discover and construct knowledge…"

Barr and Tagg 1995

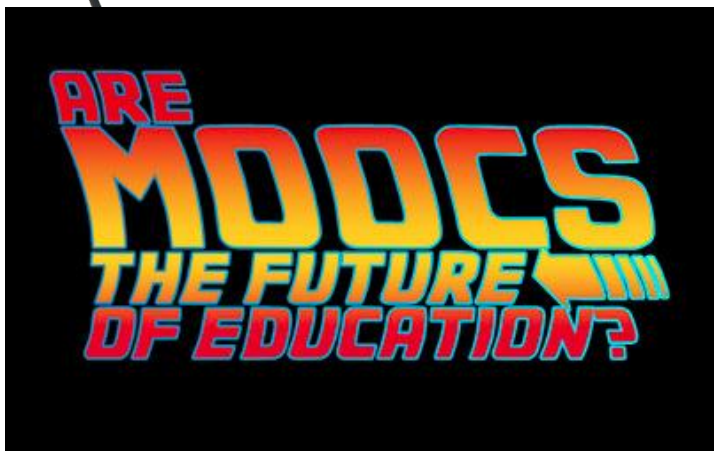
# 21st Century Paradigm Shift

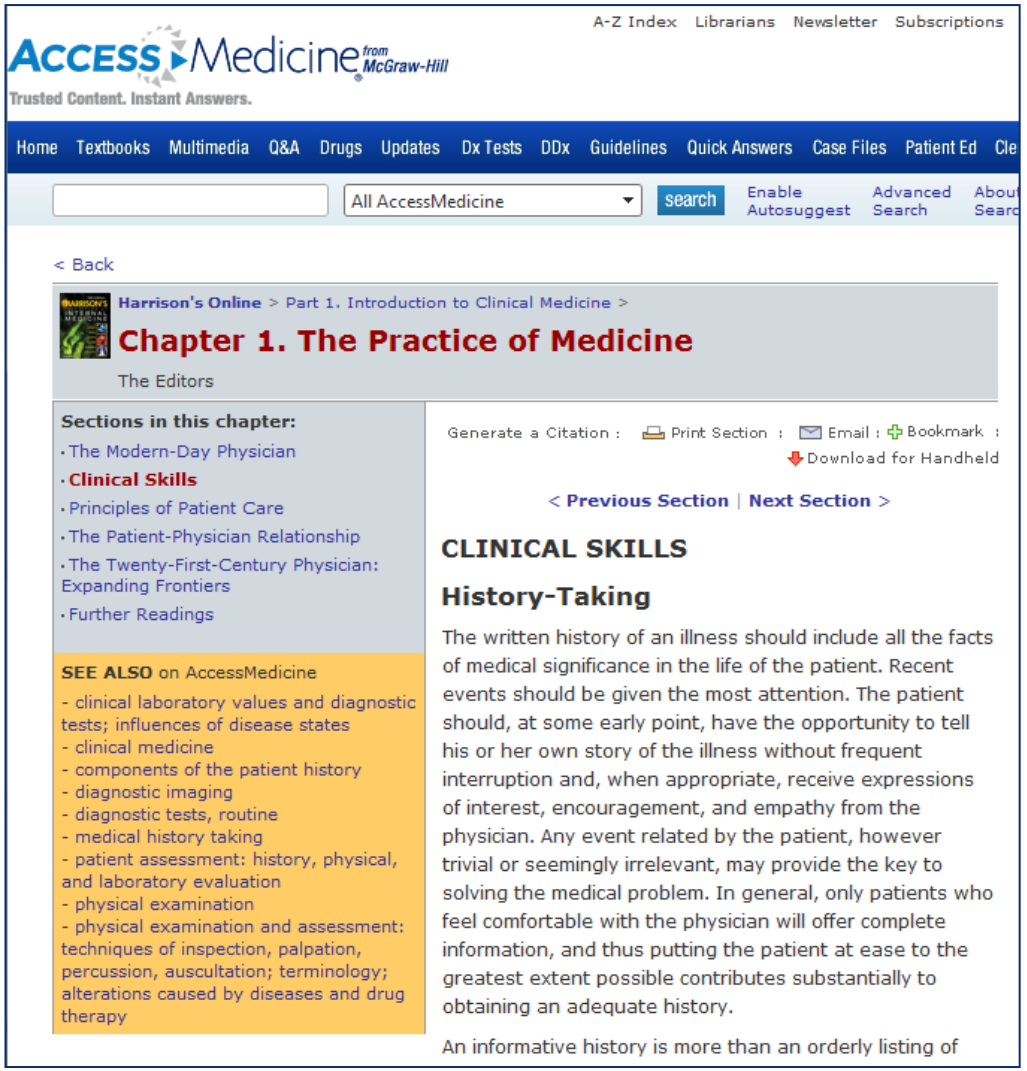


# A spectrum of tools and impact



# Translational Educational Technology



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Harrison's Online > Part 1. Introduction to Clinical Medicine >

## Chapter 1. The Practice of Medicine

The Editors

**Sections in this chapter:**

- The Modern-Day Physician
- **Clinical Skills**
- Principles of Patient Care
- The Patient-Physician Relationship
- The Twenty-First-Century Physician: Expanding Frontiers
- Further Readings

**SEE ALSO** on AccessMedicine

- clinical laboratory values and diagnostic tests; influences of disease states
- clinical medicine
- components of the patient history
- diagnostic imaging
- diagnostic tests, routine
- medical history taking
- patient assessment: history, physical, and laboratory evaluation
- physical examination
- physical examination and assessment: techniques of inspection, palpation, percussion, auscultation; terminology; alterations caused by diseases and drug therapy

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### CLINICAL SKILLS

### History-Taking

The written history of an illness should include all the facts of medical significance in the life of the patient. Recent events should be given the most attention. The patient should, at some early point, have the opportunity to tell his or her own story of the illness without frequent interruption and, when appropriate, receive expressions of interest, encouragement, and empathy from the physician. Any event related by the patient, however trivial or seemingly irrelevant, may provide the key to solving the medical problem. In general, only patients who feel comfortable with the physician will offer complete information, and thus putting the patient at ease to the greatest extent possible contributes substantially to obtaining an adequate history.

An informative history is more than an orderly listing of

# Benefits to the General Learner: Convenience

Accessible

Portable

Repeatable

Manipulate-able

Inexpensive

# Benefits to the Health Professions Learner

Makes just in time information seeking possible.

Reinforces check rather than guess habit of the mind.

Emphasizes dynamic nature of medical information

# Translational Educational Technology: Problems

- Produced as afterthought may not translate well
- Accessibility of information may discourage learning
- Passive, difficult to sustain attention
- Socially Isolating

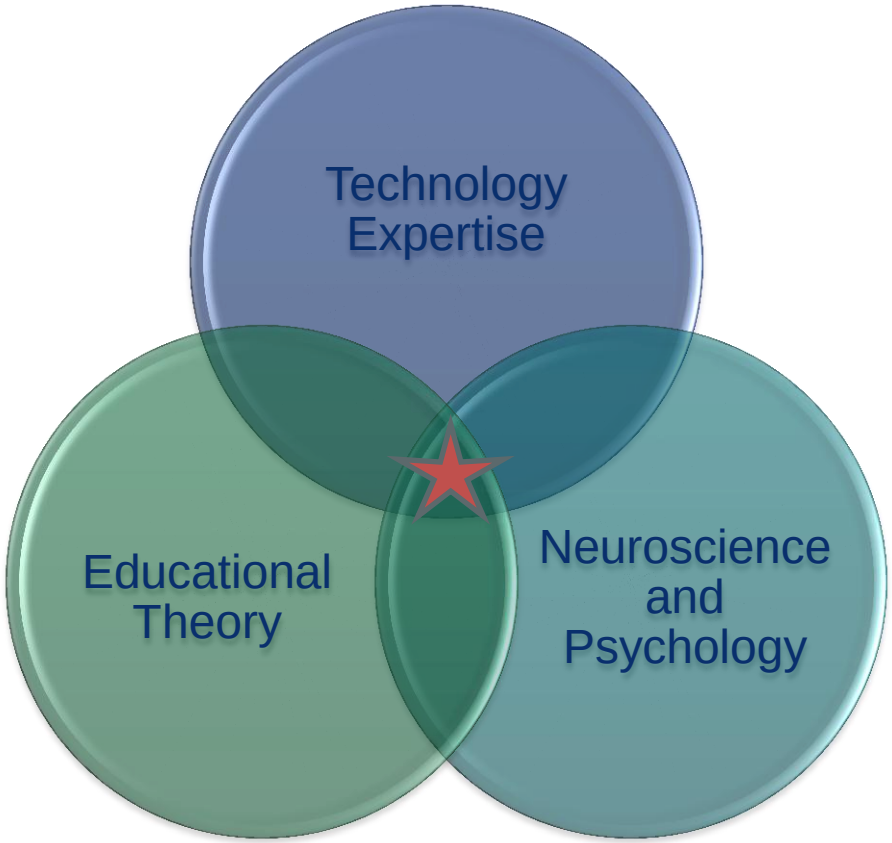
## Impact on Learning: Minor

# Key Challenge

Using technology, create an environment and experiences that brings students to discover and create knowledge, both as individuals and as members of a multidisciplinary, diverse community

# Technology Enhanced Learning Requires Integrated Expertise

Learning Friendly




Brain Friendly

# Two Types of Tasks for HP Students

## Learn Skills

Learning Theory:
**Deliberate Practice**

Technology Support:

Computer Based Tutoring

## Solve Problems

Learning Theory:
**Constructivism**

Technology Support:

Computer Based Learning

# Development of **Skill** Based Expertise

# Role of Technology in Skill Based Learning for the Health Professions

Drill and Review:

- Repository of Cases for Practice
- Sequencing of CB Cases can be developmental rather than opportunistic
- Interactive technology can provide instant feedback
- Rewards for persistence
- Safe Environment

# Computer Based Tutorials: Gaming Strategies

Sequential Gated Challenges

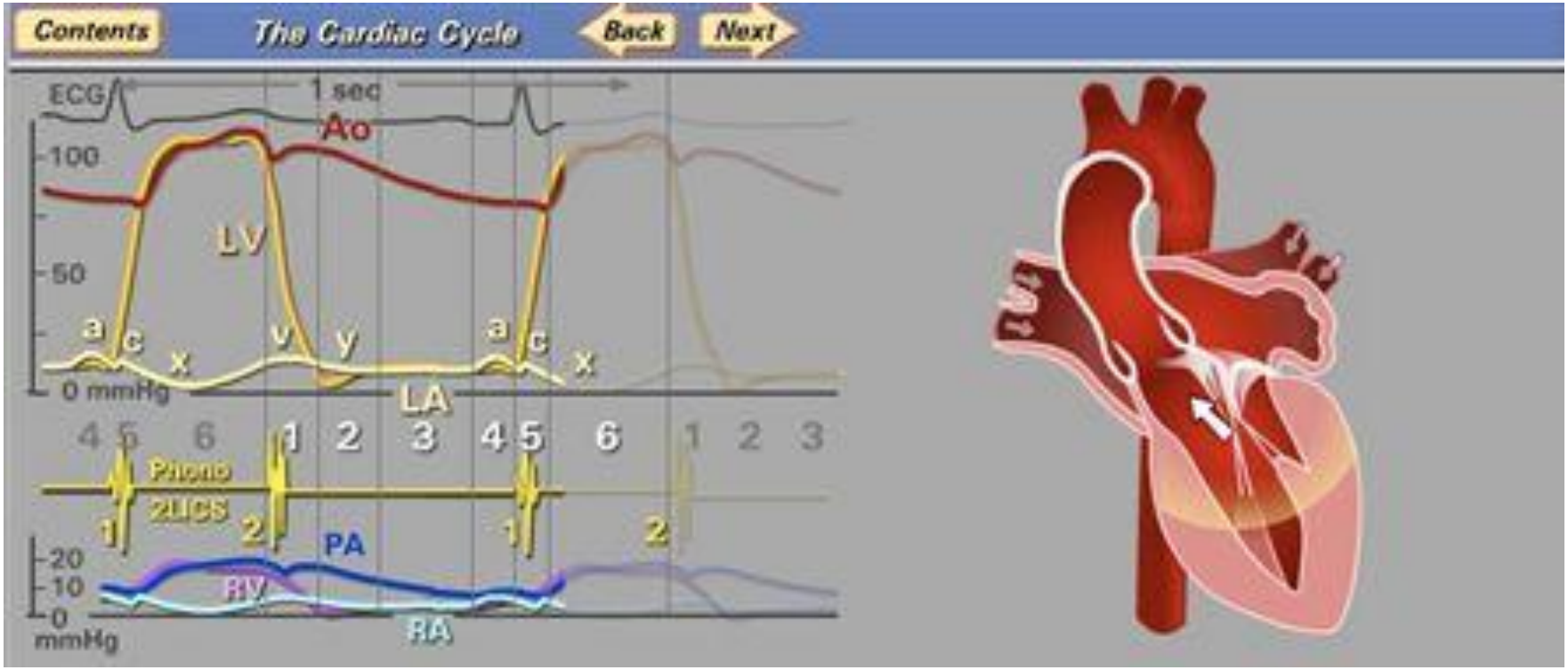
Immediate Coaching and Feedback

Challenged Again

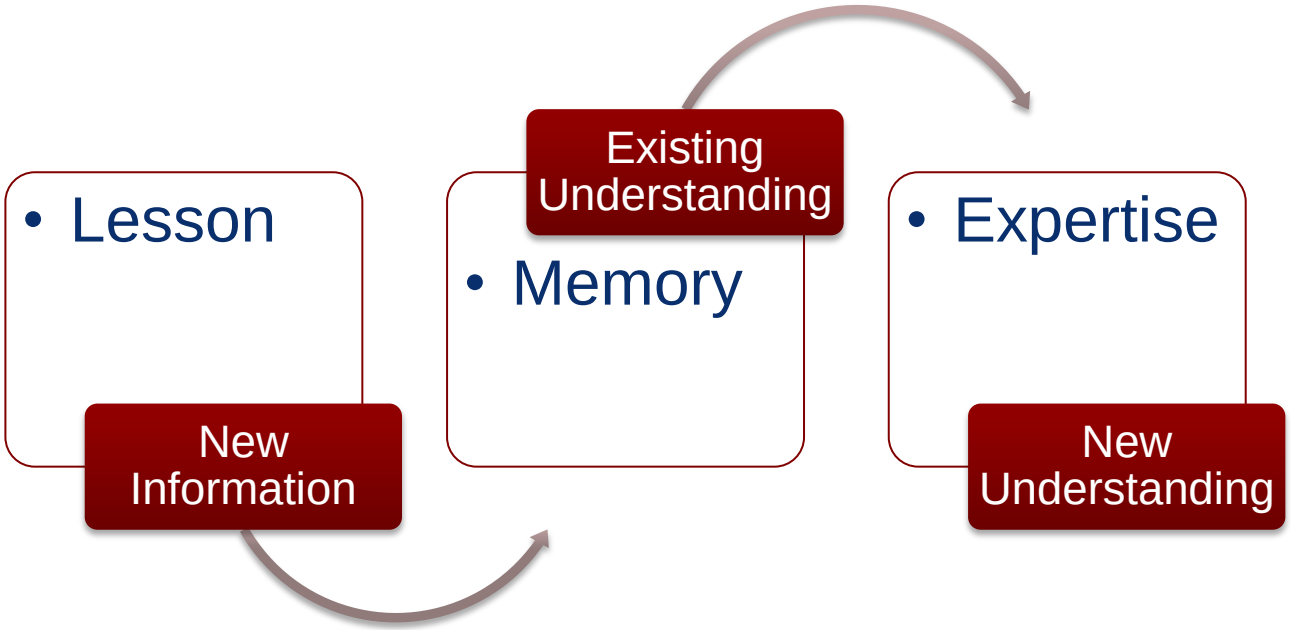


# Technology as Tutor: Cognitive-Visual Skills

# Technology as Tutor: Cognitive:Auditory Skills



# Development of Problem Solving Expertise: Constructivism



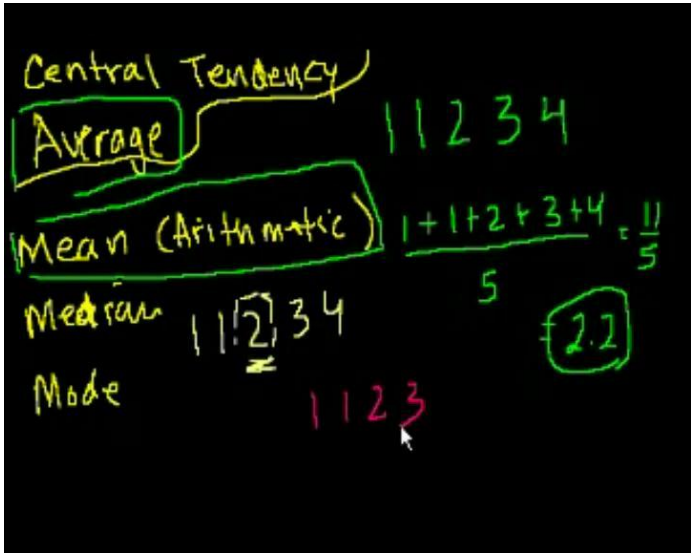

"Understanding is constructed by students, not received in messages simply to be encoded, remembered and recalled."

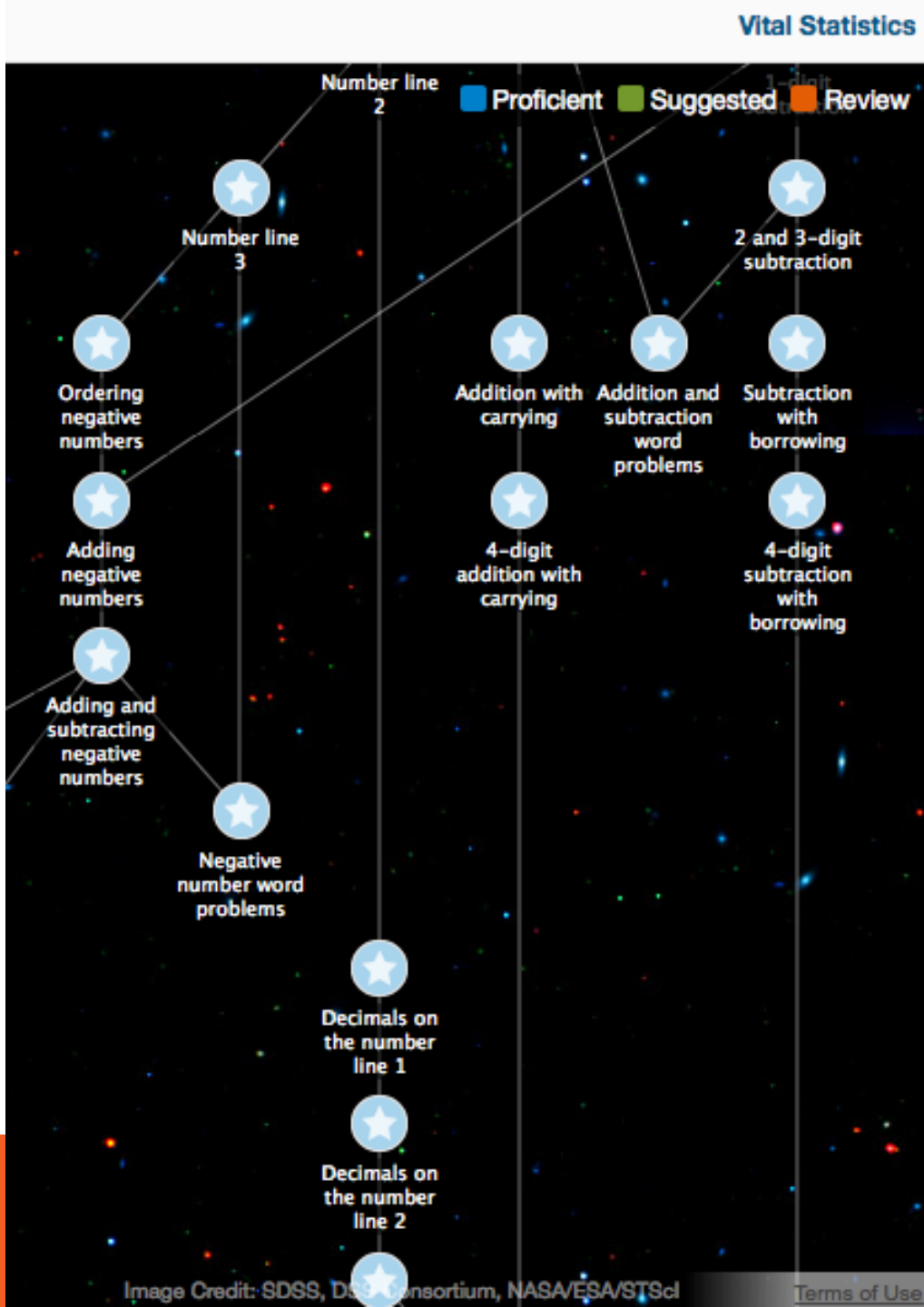
*Winn, W. Tech. Inst.Cognition and Learning 2002.*

# Constructivism in Action with Technology

| | |
|---|---|
| Engage students: | Authentic Cases |
| Goal Setting: | Pretests |
| Provide Feedback: | Progress Tests |
| Allow Choice: | Navigation Options |
| Build Mental Models: | Multiple Examples |
| Progressive Challenge: | Fading Scaffolding |
| Goal Reflection: | Mastery Testing |

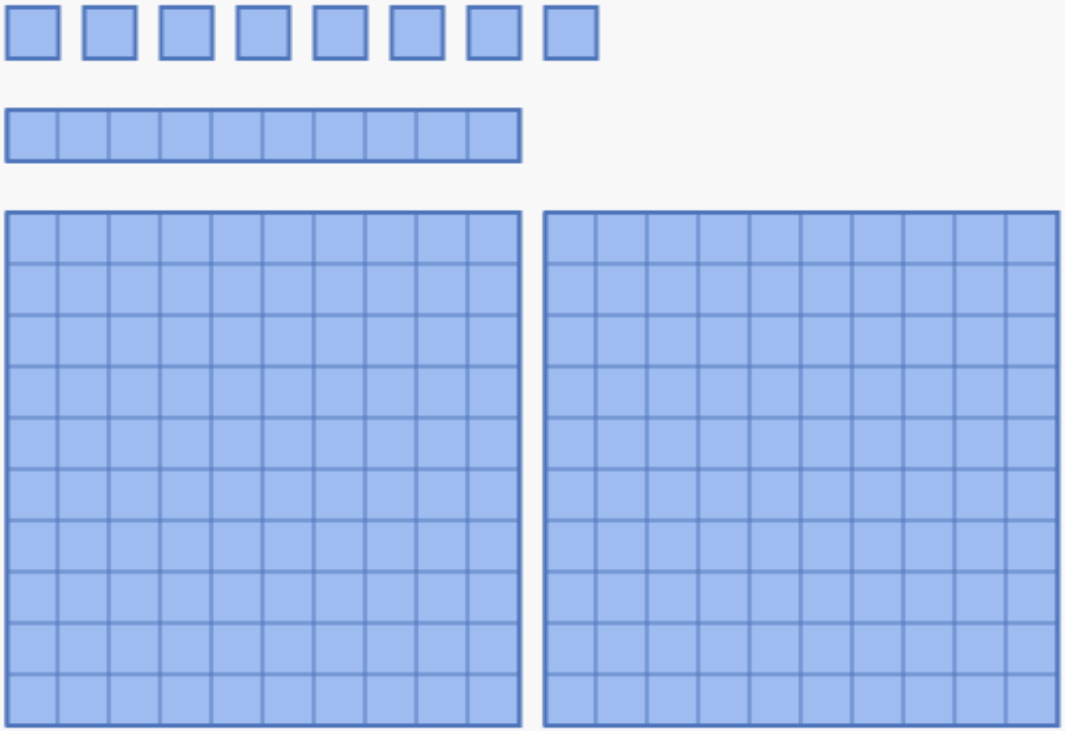
# Khan Academy



# Addition and subtraction

What number is represented by the blocks shown?



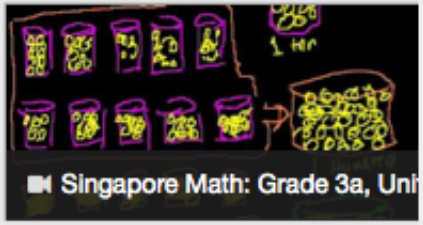
**Answer** Acceptable formats

Check Answer

**Need help?**

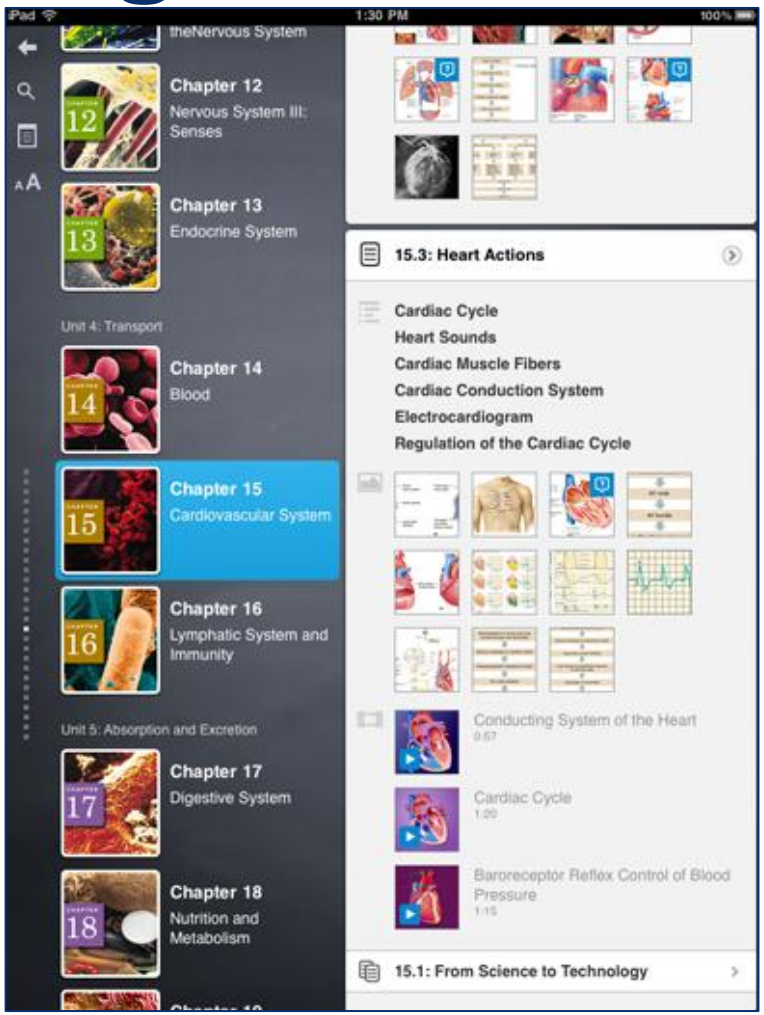
I'd like a hint

**Stuck? Watch a video.**




Show scratchpad

# Multimedia Learning Tools: Digital Textbooks




inkling

BioBook

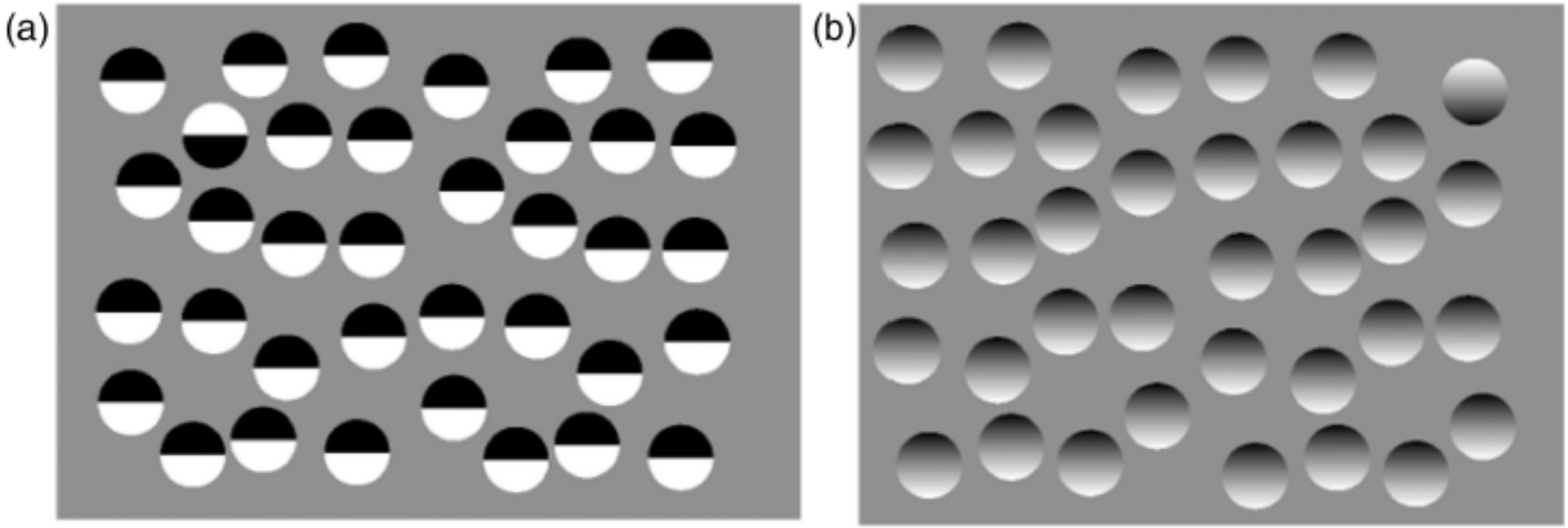
# Considering Cognitive Load

- Load: total amount of activity imposed on working memory at a given time
  - Humans Attend to 7+/- 3 audio/visual
- Intrinsic Load:
  - the material to learn
- Germane Load:
  - the work of learning
- Extraneous Load:
  - distractors

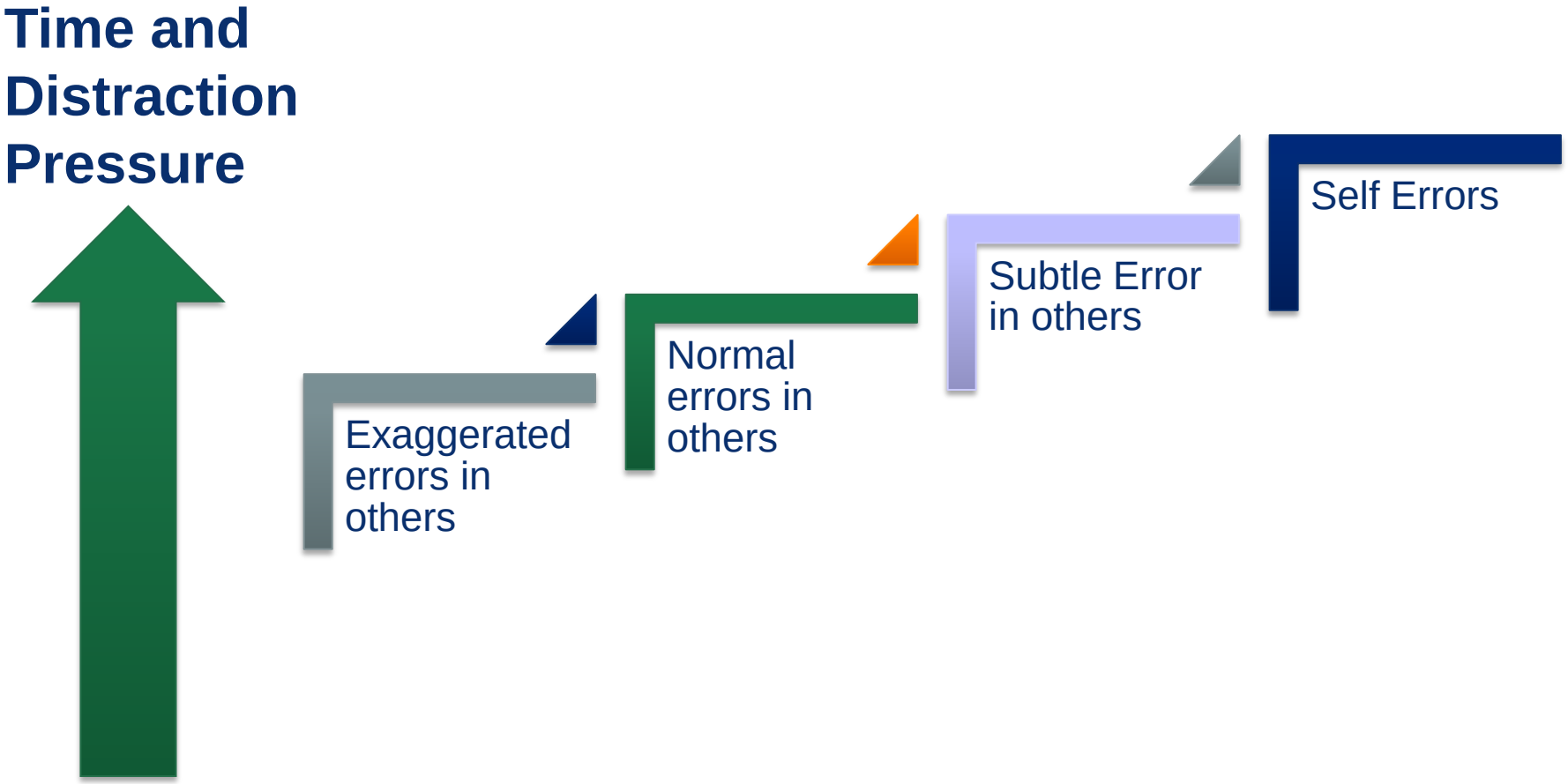
# In TEL, Less is More

- Design:
  - Sparse screen design
  - Synchronized auditory and visual challenges
    - Text processed through auditory pathway
  - Standardized visual symbols for navigation
  - All relevant information accessible
- Instructional Elements
  - Exaggerate differences rather than emphasize reality

# Presentation Impacts Cognitive Load



# MMLT:
# Brain Friendly Interactive Videos



# Holy Grail: Personal Learning Environments


- Student Progress Maps
- Learning analytics for faculty
  - Time on page, questions answered, hints used
  - Connection to demographic data
- Instructor and peer interaction through Social Media
- On the fly editing for “breaking news”
- Dynamic Course Adjustment

KNEWTON

# Lessons Learned: Good Educational Technology is Expensive

- Human Capital:  FACULTY, Instructional Designers, Graphic Designers, Educational Experts, App Developers
- Software, Videography
- Sample Costs:
  - Coursera Course:  $30-50K for production
  - Khan:  2 weeks to deconstruct a case
  - App:  $50,000 +

# Conclusions

Technology in Learning is here to stay

True Technology Enhanced Learning starts with an understanding of neuroscience and educational theory.

Our challenge is to teach students, faculty, and administrators about the best use of technology in education.