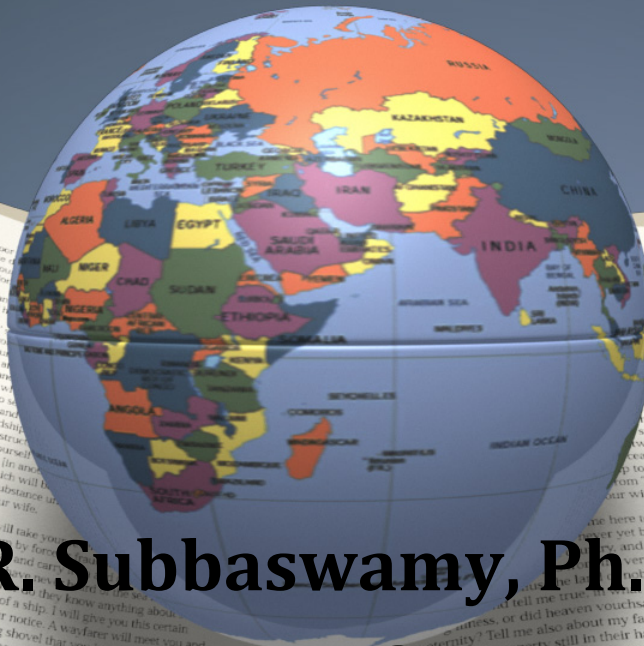


# DIALOGUE ON HIGHER EDUCATION OF THE FUTURE

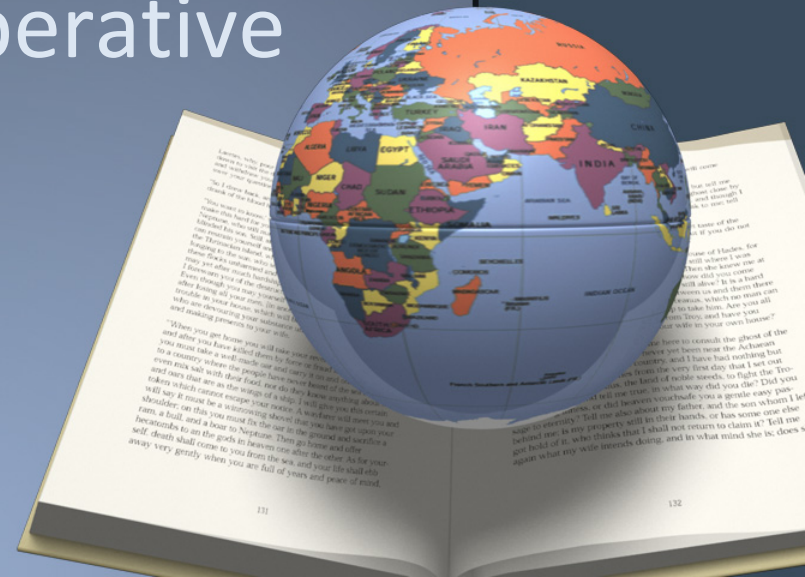
## IMPERATIVES FOR CHANGE AND SETTING THE STAGE FOR REFORM



**Kumble R. Subbaswamy, Ph.D., Provost  
University of Kentucky**

# PART 1: IMPERATIVES FOR DRASTIC CHANGE

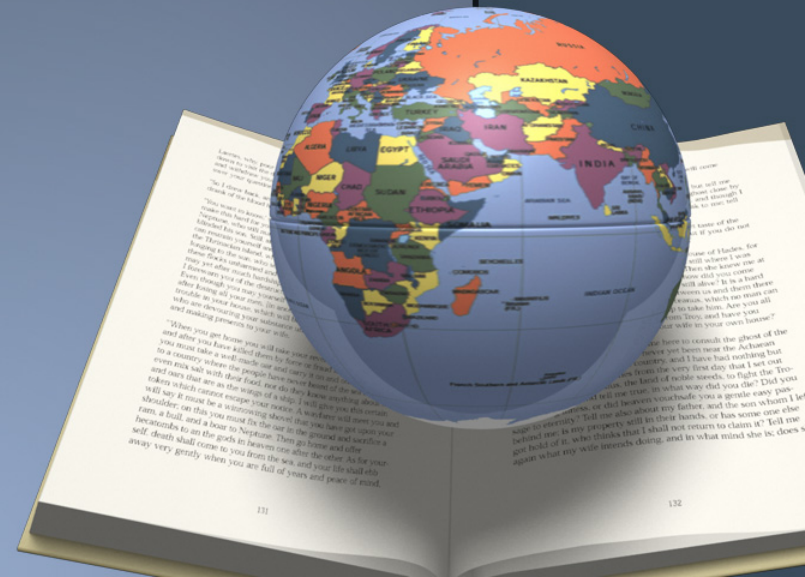
- The Cost Imperative
- The Technology Imperative
- The Demographic Imperative



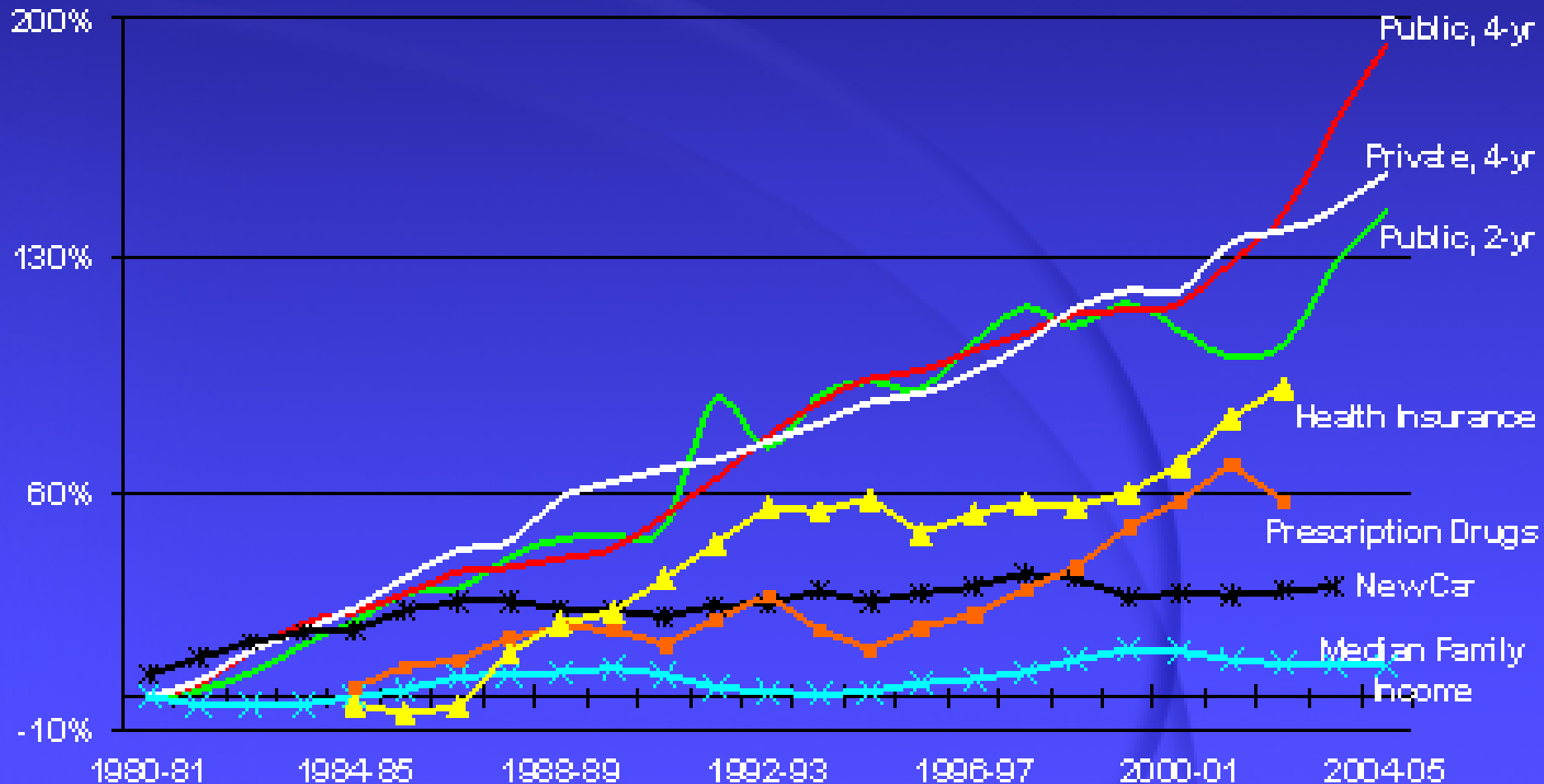
# THE COST IMPERATIVE

## CHANGE IN COST & PRICE OF VARIOUS SECTORS 1980 - 2005

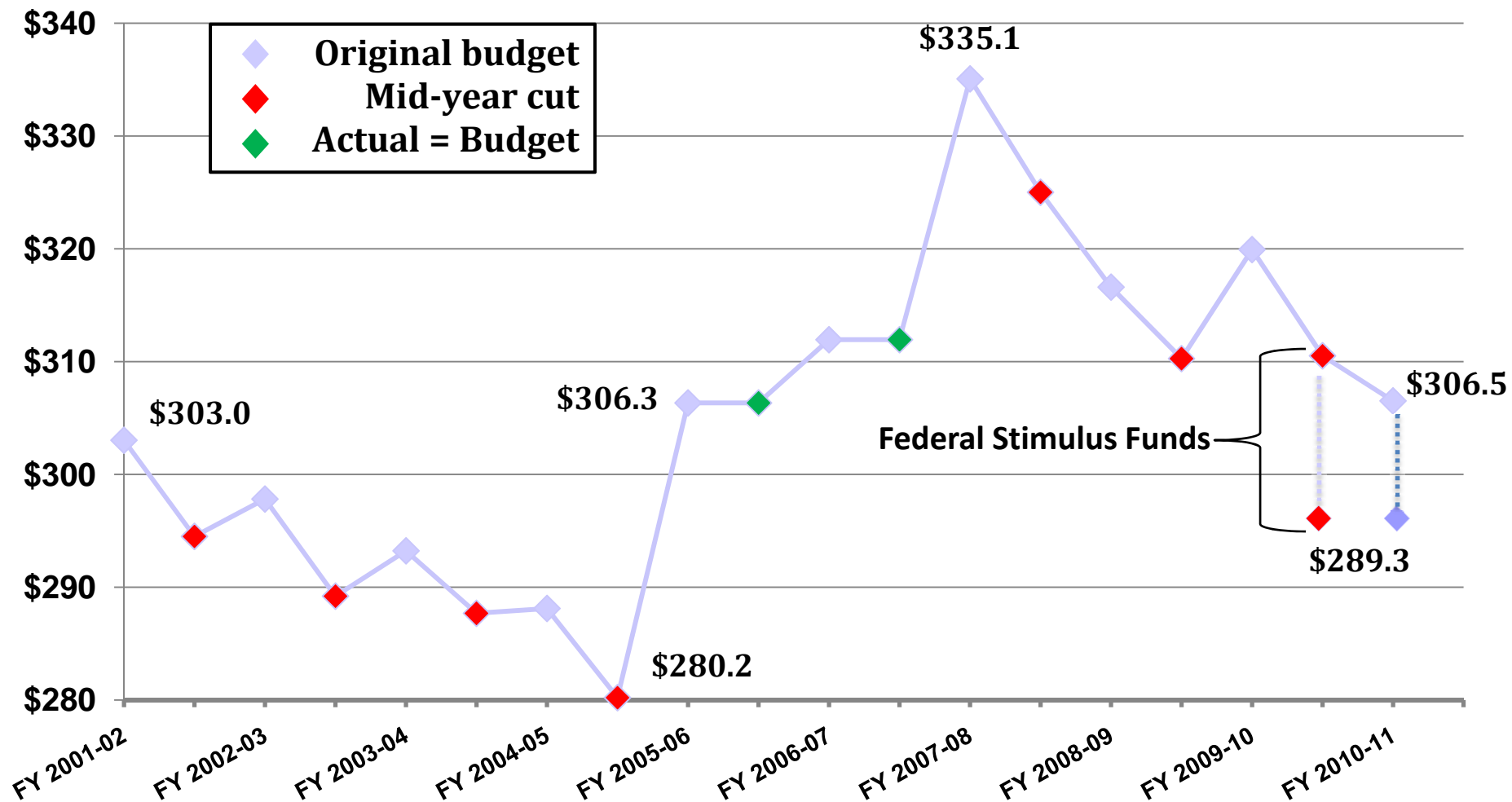
- Rank these in terms of highest increase to lowest increase:
  - Median Home Price
  - New Car
  - Prescription Drugs
  - College Education



# Price of College



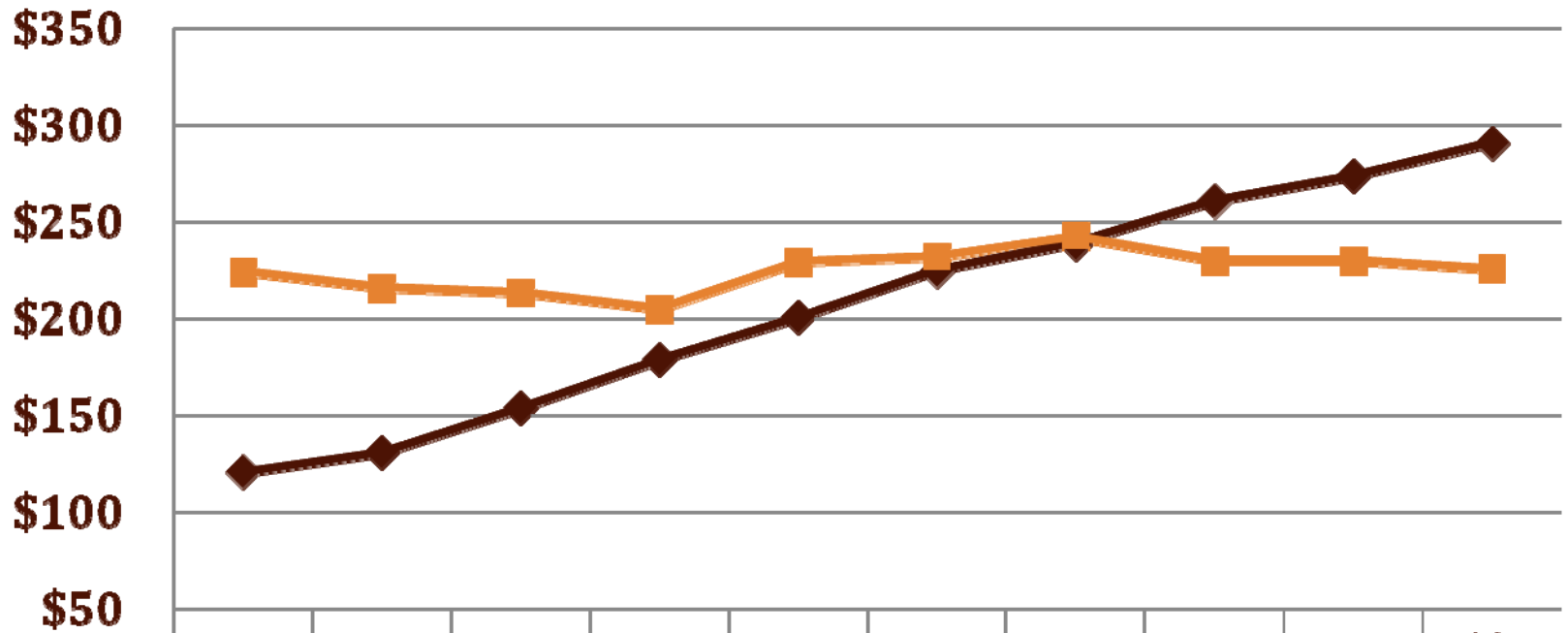
# State Support - net of debt service (in millions)



For FY 2009-10, the state replaced \$21.1 million in state appropriations with federal stimulus funds. For FY 2010-11, the state will replace \$17.2 million in state appropriations with federal stimulus funds.



# TUITION AND MANDATORY FEE REVENUE AND NET STATE SUPPORT (ACTUAL - IN MILLIONS)



	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11*
◆ Tuition & Fees	\$121	\$131	\$154	\$179	\$201	\$225	\$239	\$261	\$274	\$291
■ State	\$224	\$216	\$214	\$205	\$229	\$232	\$243	\$230	\$230	\$226

State support net of debt service and mandated programs. Includes stimulus funds.

\*Projected

# HEADLINES

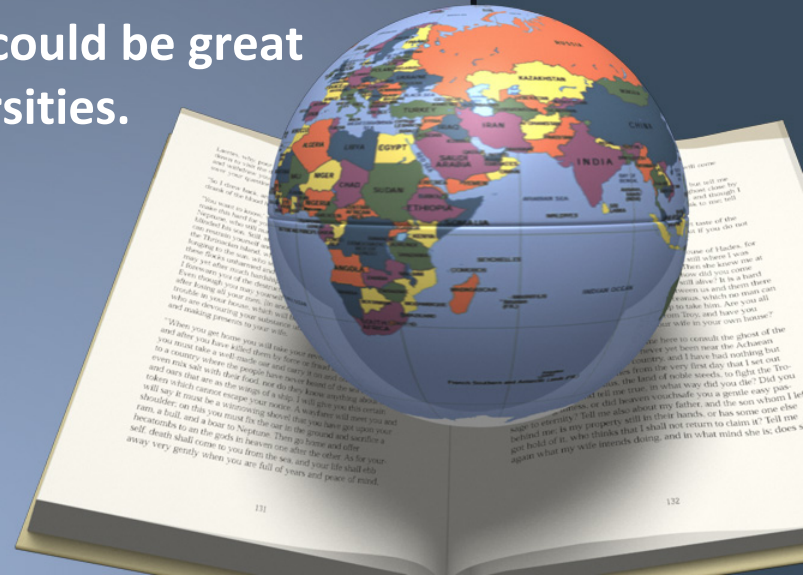
- January 21, 2010  
*Business Week*

**Tuition-Free University Gains a Following**

- September / October 2009  
*Washington Monthly*

**College for \$99 a Month:**

**The next generation of online education could be great for students—and catastrophic for universities.**



# THE TECHNOLOGY IMPERATIVE

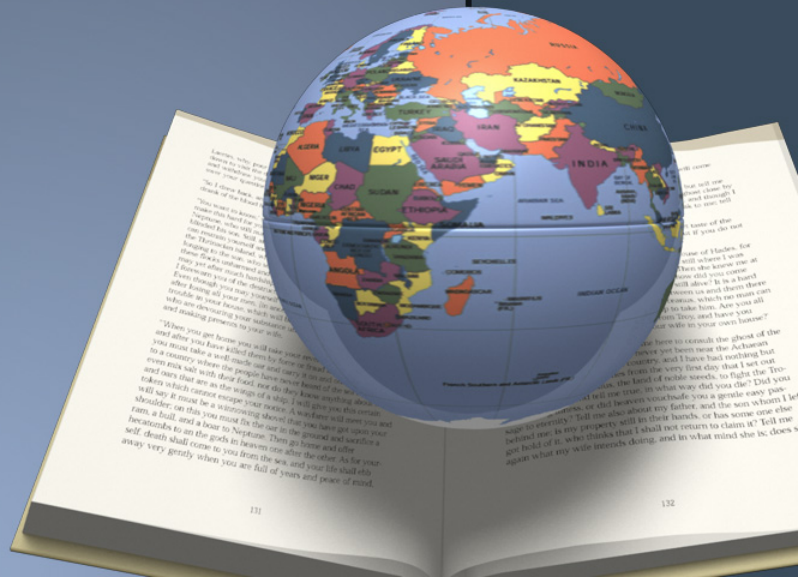
One Example:



Google Digitization Project



End of Libraries as we know them!



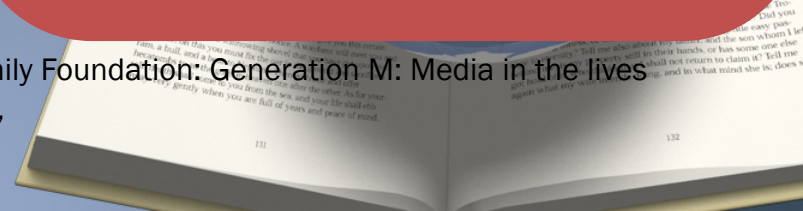
# The New Digital Generation Will Expect a Different College Experience



## “OPEN EDUCATIONAL RESOURCES”

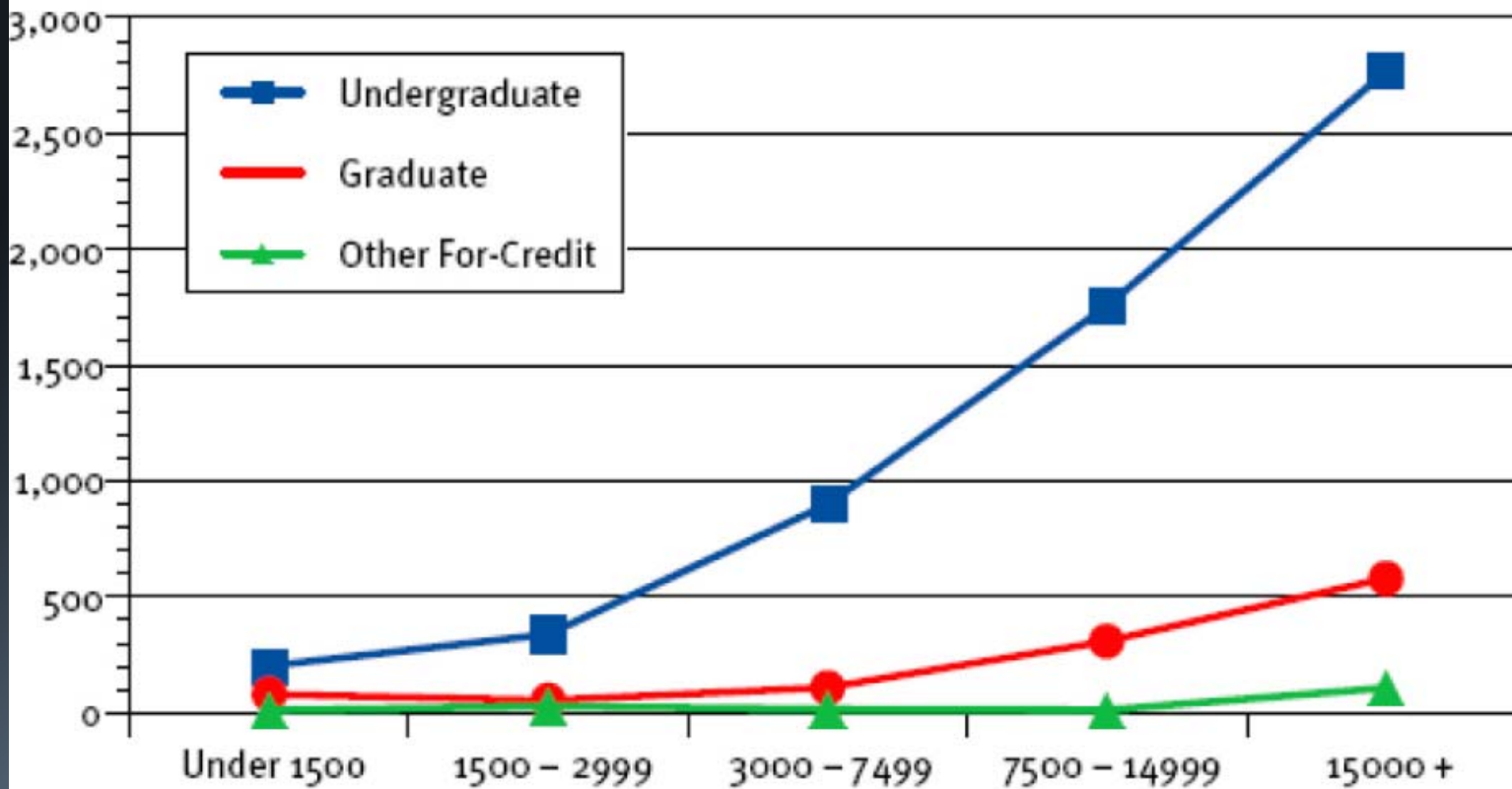
- “Anytime Anywhere” or Personalized Learning
- Learning simulations
- e- and Blended Learning
- Online networking apps
- Alternate Reality Learning

Sources: [http://www.pewinternet.org/PPF/r/29/press\\_release.asp](http://www.pewinternet.org/PPF/r/29/press_release.asp), Kaiser Family Foundation. Generation M: Media in the lives of 8-18 year olds, <http://news.bbc.co.uk/1/hi/sci/tech/1834682.stm>, <http://chronicle.com/weekly/v54/i04/04a02401.htm>



# Catching up with Technology

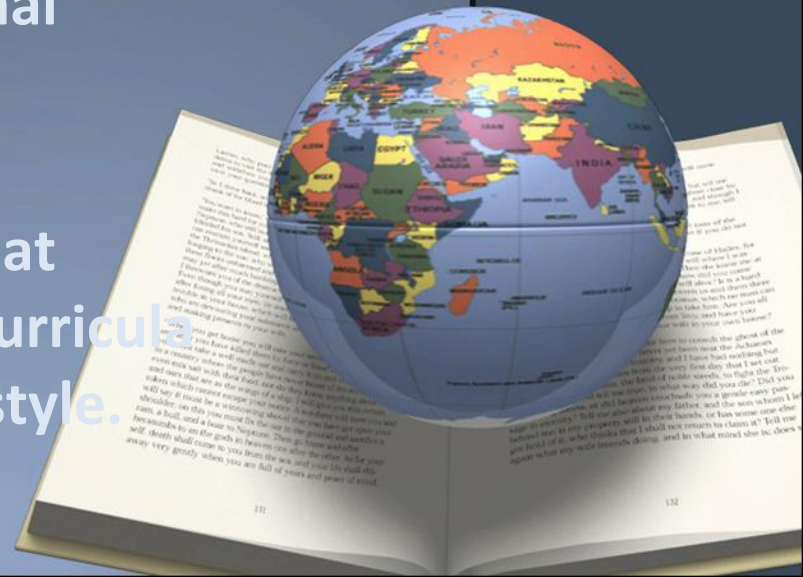
## Mean Online Enrollment by Institutional Size



# THE DEMOGRAPHIC IMPERATIVE

*From Chronicle Research Services Report:  
The College of 2020: Students (June 2009)*

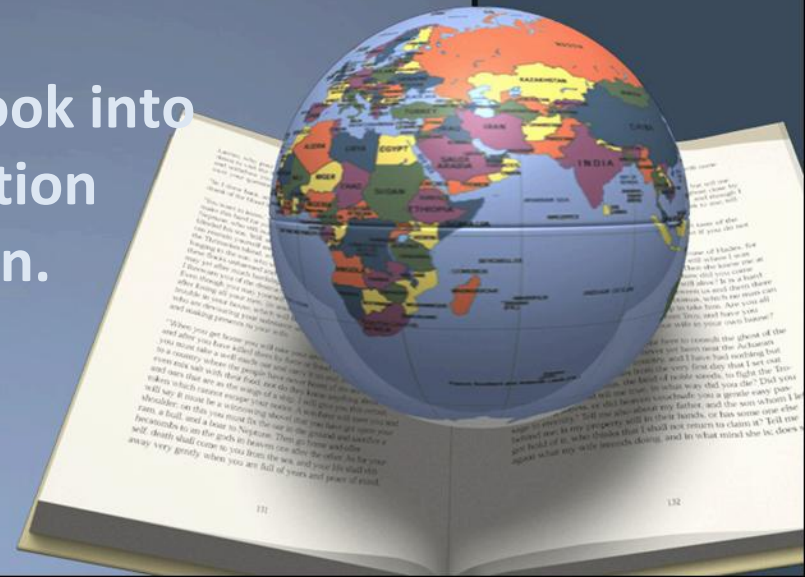
- The freshman of 2020 is a first grader today.
- Research shows that 82% of children ages 2 to 5 play games on video-game consoles.
- Today's high-school students, the so-called New Millennials, see their educational futures built almost entirely around technology.
- Educators are increasingly finding that students want to design their own curriculum and find ways to learn in their own style.



# THE DEMOGRAPHIC IMPERATIVE,

## CONTINUED

- The numbers of white non-Hispanic and black non-Hispanic graduates will decrease in almost every year until 2021-22. Those decreases will be offset by increases in the numbers of Hispanic and Asian/Pacific Islander graduates.
- If colleges expect to increase attendance, they also need to look into the high-school dropout population because of financial stratification.



# THE DEMOGRAPHIC IMPERATIVE, CONTINUED

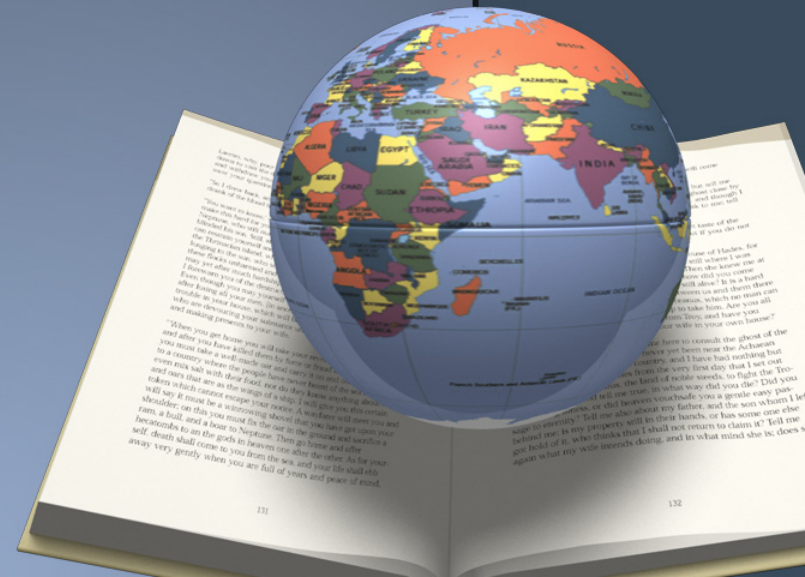
- The overall college enrollments continue to go up, but there is a gradual aging of the college-going population.
- More students will attend classes online, study part time, take courses from multiple universities, and jump in and out of colleges.
- The for-profit sector is more nimble and picks up on trends in the marketplace more quickly. The for-profit sector in higher education is growing at a pace that far outstrips that of higher education as a whole.
- The number of people in the world seeking higher education is estimated to double by 2025, to 200 million. (*The Chronicle*, March 6, 2009)



# PART 2:

# SETTING THE STAGE FOR REFORM

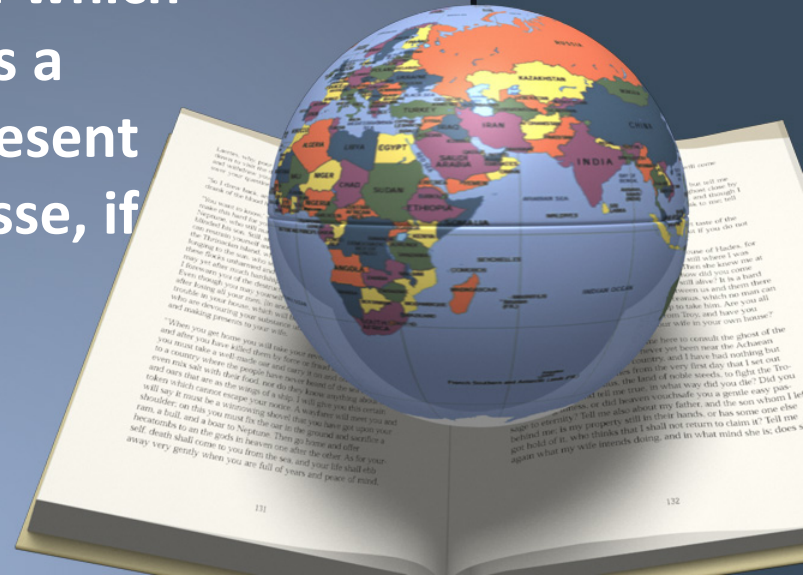
- What is innovation?
- Can innovation be achieved intentionally?  
How?
- Today's educational landscape: The need for different paradigms



# Disclaimer

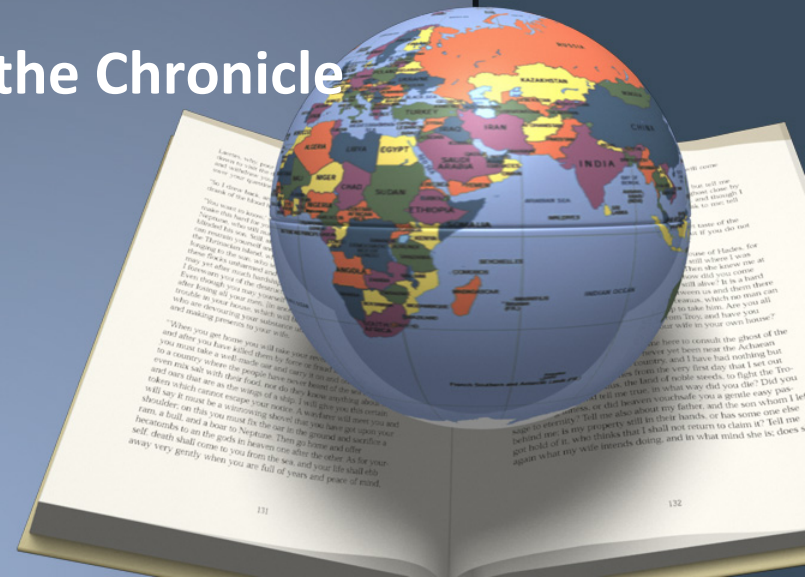
Erwin Schrodinger in “What is Life?”

“A scientist is supposed to have a complete and thorough knowledge, at first hand, of some subjects and, therefore, is usually expected not to write on any topic of which he is not a master. This is regarded as a matter of noblesse oblige. For the present purpose I beg to renounce the noblesse, if any, and to be freed of the ensuing obligation.”



# References

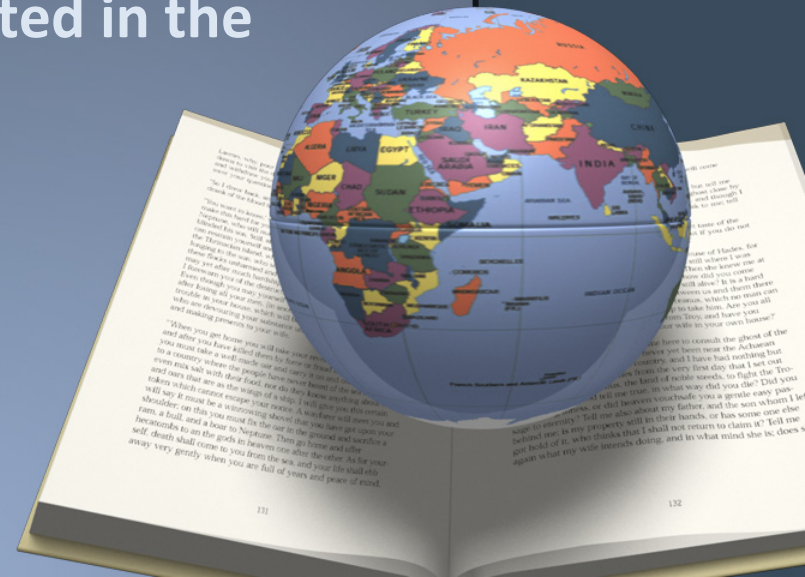
- Frans Johansson: *The Medici Effect* (Harvard, 2006)
- Curtis Bonk: *The World Is Open* (Jossey-Bass, 2009)
- Michael Speaks (UK Design Dean): “*Design Thinking*” (speeches and articles)
- Op-Ed columns in NYT, Reports in the Chronicle of Higher Education



# Problem Solving vs. Innovation

- Problem solving answers questions without questioning the problem (shapes the known)
- Innovation interrogates and reforms the problem and adds value by creating knowledge/product not anticipated in the problem.

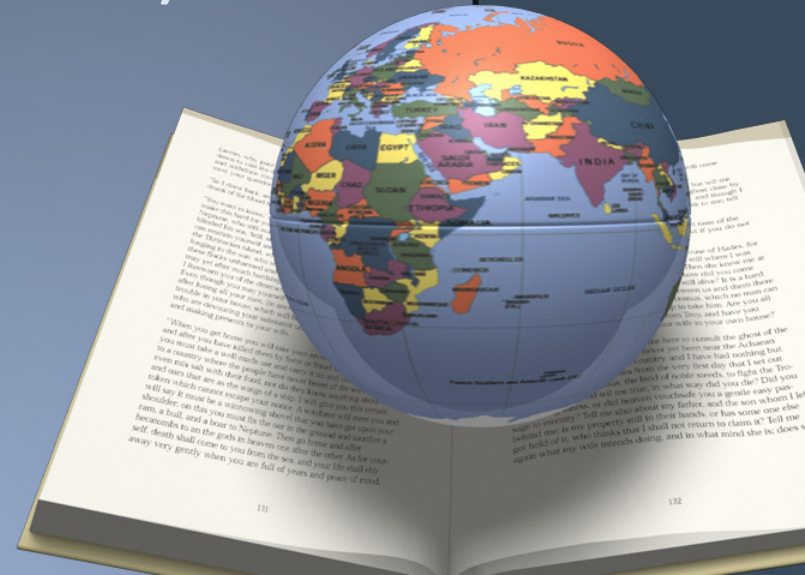
(Peter Drucker)



# Creativity and Innovation

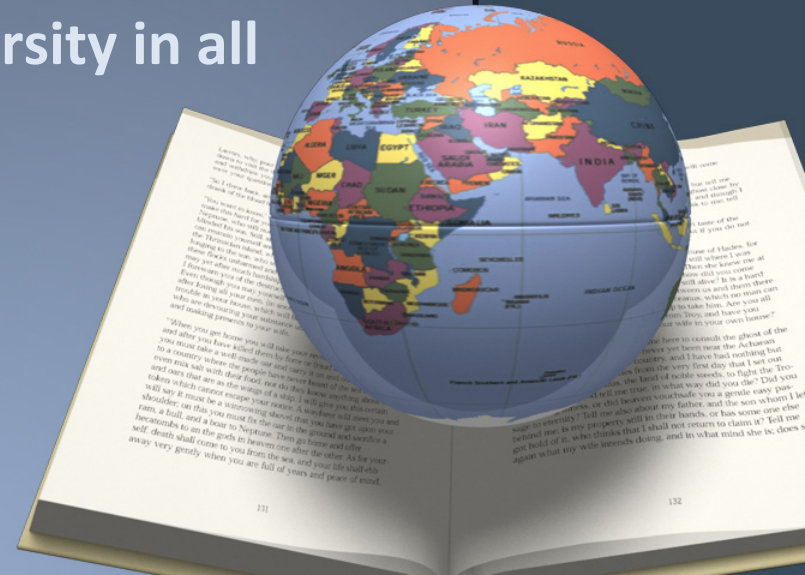
- Creative ideas are new and valuable.
- Innovative ideas must not only be valuable, they must become realized (put to use).

(Johansson)



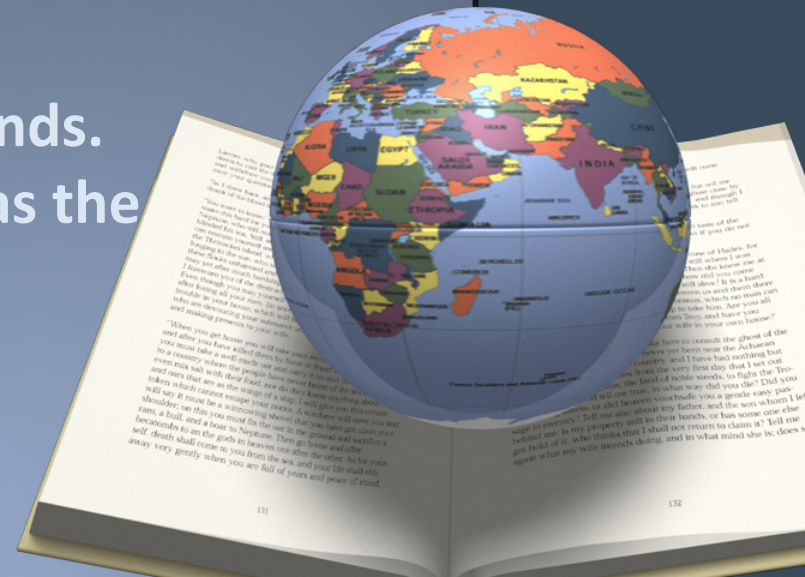
# The Medici Effect

- Johansson's hypothesis: *The best chance to innovate occurs at the intersection of fields.*
- A field describes disciplines, cultures, and domains in which one can specialize through education, work, hobbies, traditions, or other life experience.
- Strong argument for cultivating diversity in all its forms.



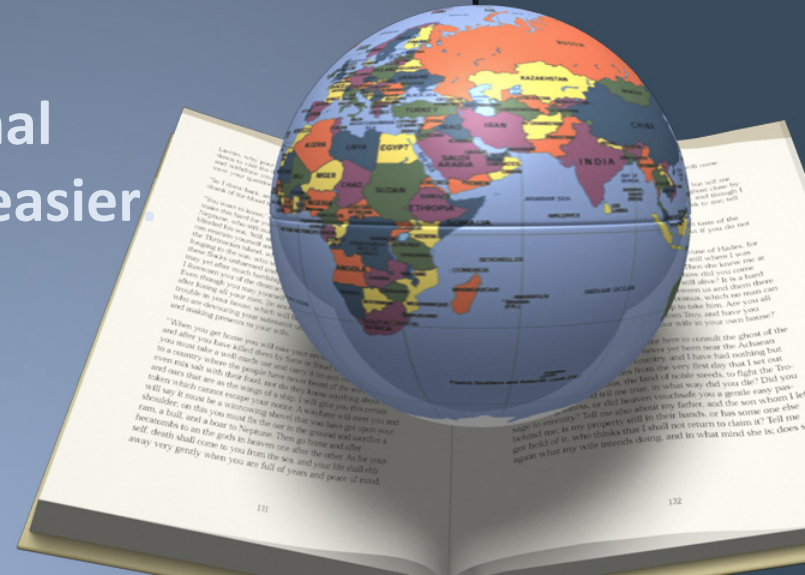
# Dawkins: The Selfish Gene and “Meme”

- “*Memes*” (building blocks of culture) propagate themselves in the *meme* pool by leaping from brain to brain via a process which, in the broad sense, can be called imitation.
- *Memes* compete for space in our minds. [Field of Memetics; e.g., marketing as the creation of an idea epidemic.]



# Innovation from Intersection

- Bringing together a diversity of ideas, cultures, disciplines, traditions enhances the opportunity for their intersection (and hence, innovation).
- Interdisciplinary approaches increase the chances for innovation.
- Technology (increase in computational power) makes new explorations far easier.



# Santa Fe Institute

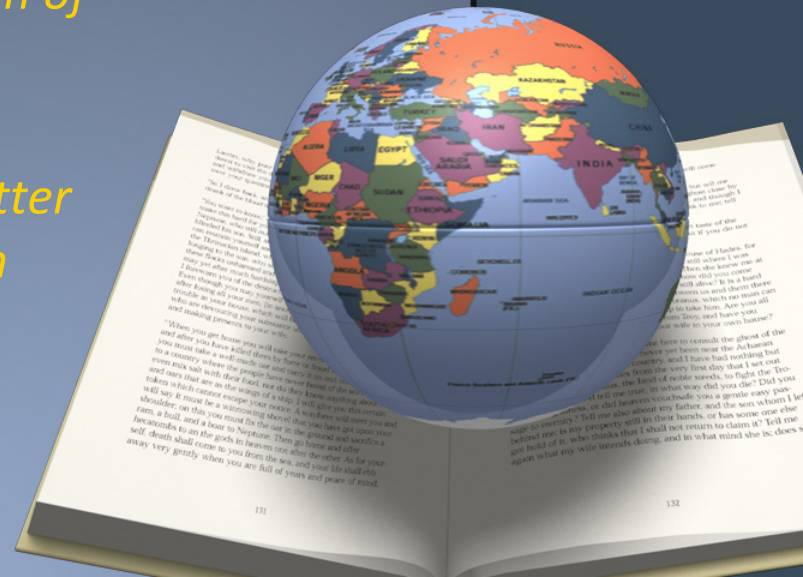
- Designed to create intersection of fields.
- Example of a Santa Fe Colloquium Announcement:

*Thursday, February 18, 2010 3:30 PM Noyce Conference Room*

*Colloquium - "Home Depot" Model of Evolution of Prokaryotic Metabolic Networks and Their Regulation"*

*Sergei Maslov, Department of Condensed Matter Physics and Materials Science, Brookhaven National Laboratory*

<http://www.santafe.edu/>

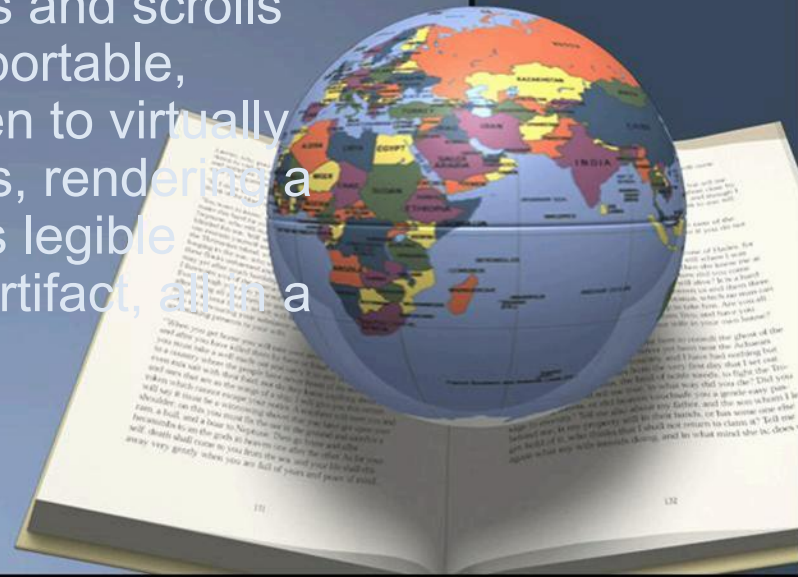


# Close to home: The University of Kentucky Center for Visualization & Virtual Environments



# Close to Home: the University of Kentucky Center for Visualization & Virtual Environments

- “[U]se 21st century technology to preserve the traces of ancient cultures before the relics disappear forever. The EDUCE project (Enhanced Digital Unwrapping for Conservation and Exploration) is developing a hardware and software system for the virtual unwrapping and visualization of ancient texts.
- The overall purpose is to capture in digital form fragile 3D texts, such as ancient papyrus and scrolls of other materials using a custom built, portable, multi-power CT scanning device and then to virtually “unroll” the scroll using image algorithms, rendering a digital facsimile that exposes and makes legible inscriptions and other markings on the artifact, all in a non-invasive process.”



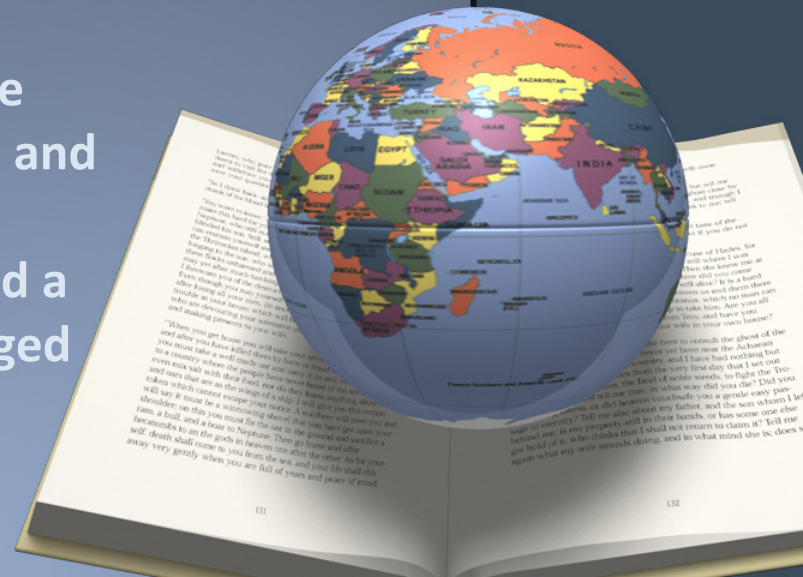
# Close to home: UK on Second Life



# Close to home: Anatomy in Second Life

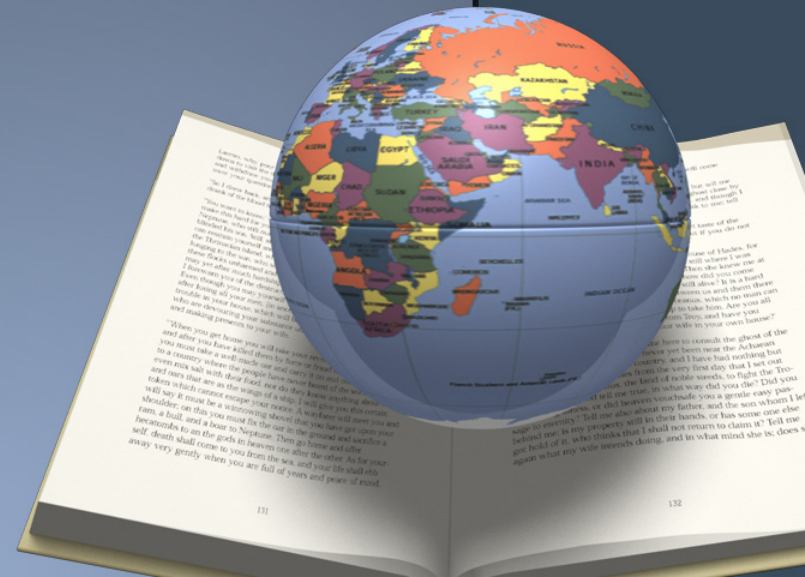
- Novel use of Team-Based Learning among undergraduates in a virtual anatomy lab experience using Second Life™ (SL) technology. Second Life is a 3-D, virtual world in which people are represented by avatars. In the present study, a small population of students in undergraduate anatomy completed a virtual anatomy session in SL.
- According to a follow-up survey, students reported an enhanced understanding of the topic due to the increased student-student and faculty-student interaction. In addition, students reported that the avatars provided a certain pseudo-anonymity that encouraged more student participation.

(Dr. Jennifer Brueckner, et al. COM)



# Some techniques to create an environment conducive to innovation

- Overcome associative barriers (both cultural and disciplinary biases) by exposing yourself to multiple disciplines/cultures
  - Take on multiple perspectives
  - Reverse assumptions
  - Randomly combine concepts
  - Break out of your network
- .....you get the idea!



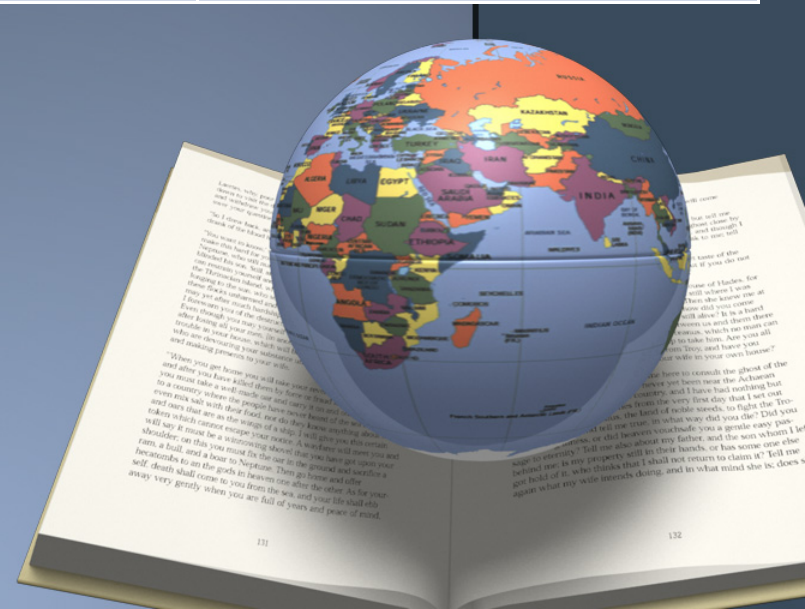
# Assumption Reversal Example (from Johansson)

1. *No menu*: Chef tells customers what ingredients he has; customers choose items and Chef prepares dishes.

2. *No charge for food*: A café with free finger-food; no charge for food, but there is charge for time spent!

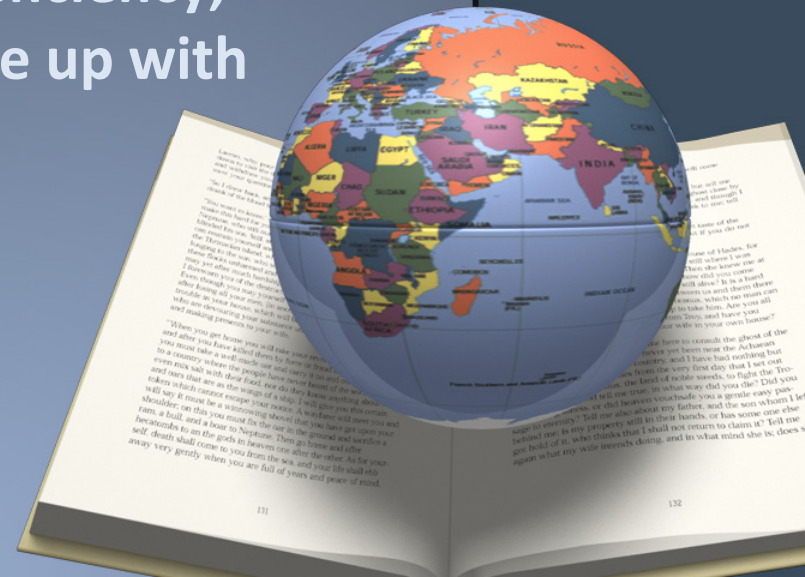
3. *No food service*: Service charge for time spent (in a unique décor), but customers bring their own food!

Assumption	Reversal
Restaurants have menus	Restaurants have no menus
Restaurants charge money for food	Restaurants don't charge money for food
Restaurants serve food	Restaurants do not serve food



# Educational Context

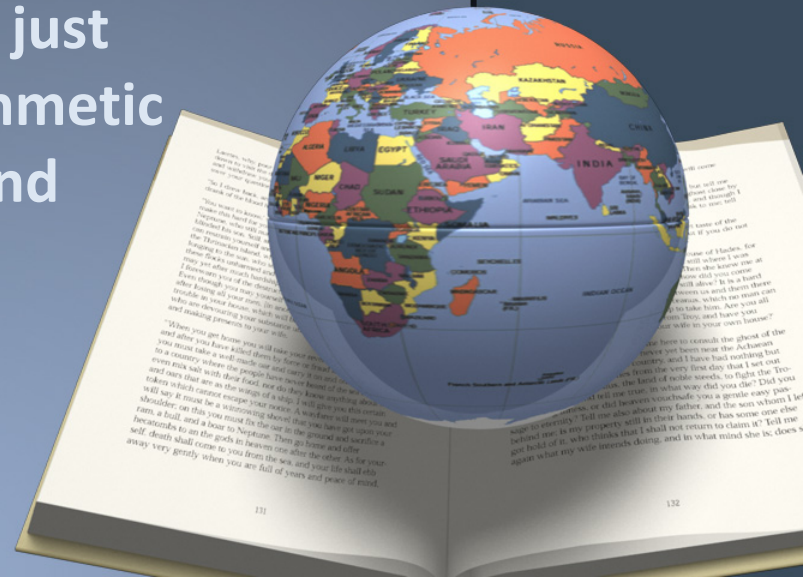
- Einstein defined insanity as “doing the same thing over and over, and expecting a different result.”
- Seemingly intractable research problems: can you think of radically different (intersectional) approaches?
- Student drop-out, math/science deficiency, etc. seem intractable. Can we come up with radically different approaches?



# NYT “The New Untouchables” from Thomas Friedman

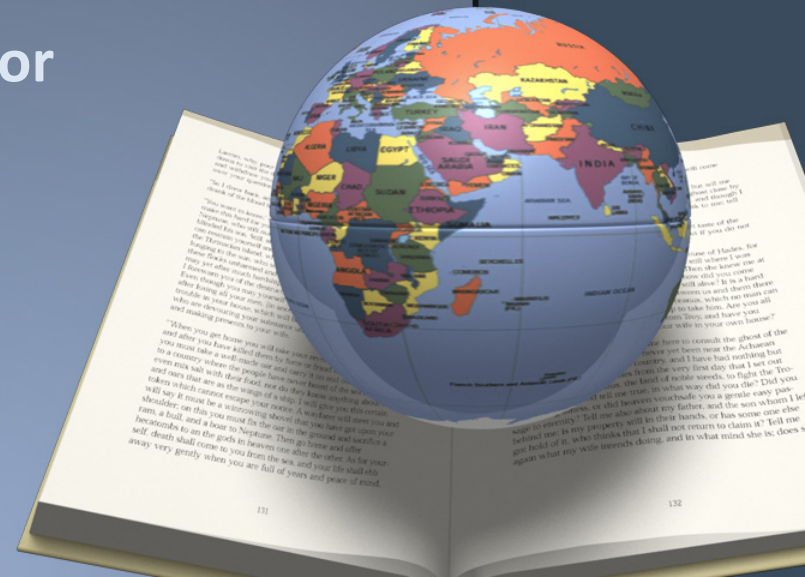
- In a world in which more and more average work can be done by a computer, robot or talented foreigner faster, cheaper “and just as well,” vanilla doesn’t cut it anymore. It’s all about what chocolate sauce, whipped cream and cherry you can put on top. So our schools have a doubly hard task now — not just improving reading, writing and arithmetic but entrepreneurship, innovation and creativity.

(Quoting Daniel Pink, author of  
“A Whole New Mind”)



# Potential Assumption Reversals: Exemplars

- College courses must be face-to-face, and offered in 3-hours/week blocks.
- Mechanics must be taught before electromagnetism.
- Plant and animal physiology should be studied separately, in separate departments.
- Physics must be a pre-requisite for pre-med students.



# THE FUTURE

- Current business model will continue to work for the foreseeable future.
- Every college, meanwhile, must adapt to a new breed of student. The students of 2020 will demand an education on their terms and will be seeking a technology-based customized approach. The bottom line is they will want it all: a plethora of learning options that they can mix and match to play to their strengths.

