ECONOMIC REALITIES
INFLATION-ADJUSTED PUBLISHED TUITION AND FEES, 1980-81 TO 2010-11 (1980-81 = 100)

SOURCE: The College Board, Trends in College Pricing 2010, Figure 5.
AVERAGE ANNUAL PERCENTAGE INCREASES IN INFLATION-ADJUSTED PUBLISHED PRICES BY DECADE, 1980-81 TO 2010-11

SOURCE: The College Board, *Trends in College Pricing 2010*, Figure 4.
TOTAL FALL ENROLLMENT IN DEGREE-GRANTING INSTITUTIONS, BY SECTOR, 2000–2009

**Full-Time**

**Part-Time**

SOURCE: The College Board, *Trends in College Pricing 2010*, Figure 17A and Figure 17B.
ANNUAL PERCENTAGE CHANGES IN STATE APPROPRIATIONS FOR HIGHER EDUCATION PER FULL-TIME EQUIVALENT (FTE) STUDENT AND IN TUITION AND FEES AT PUBLIC FOUR-YEAR INSTITUTIONS IN CONSTANT 2009 DOLLARS, 1979-80 TO 2009-10

SOURCE: The College Board, *Trends in College Pricing 2010*, Figure 10A.
TOTAL STATE APPROPRIATIONS IN CONSTANT 2009 DOLLARS (IN BILLIONS), APPROPRIATIONS PER PUBLIC FTE STUDENT IN CONSTANT 2009 DOLLARS (IN THOUSANDS), AND PUBLIC FTE ENROLLMENT (IN MILLIONS), 1979-80 TO 2009-10

SOURCE: The College Board, *Trends in College Pricing 2010*, Figure 10B.
INFLATION-ADJUSTED ENDOWMENT ASSETS PER FTE STUDENT, PRIVATE NONPROFIT FOUR-YEAR COLLEGES AND UNIVERSITIES RELATIVE TO 1999-2000, 1999-2000 TO 2008-09

SOURCE: The College Board, Trends in College Pricing 2010, Figure 15A.
AND STILL MORE...


- Inflation Adjusted Outlays [millions]*
- Nominal Outlays [millions]

* Constant 2008 U.S. Dollars

Projection from FY2011 U.S. Budget

© Political Calculations 2010
LOOKING AHEAD

Higher Ed not expected to return to historic 2008 / 09 levels until 2012, but still projected to be strongest (and growing) category

Source: FMI Management Consulting Report, 9/10/10
WHO MOVED MY SPACE?
WHO’S LEARNING?
“ACTIVE LEARNING” SPACE

Studio Classroom at the University of Minnesota
Lucas Expansion Education Project (LEEP)
STANFORD UNIVERSITY

Lucas Expansion Education Project (LEEP)
School of Medicine
Li Ka Shing Center for Learning and Knowledge
**SUNY Buffalo, Econ 101**
- The redesign significantly increased student learning outcomes, improved student success rates from 67% to 76%, 79% and 85% in subsequent semesters, and reduced costs by 46% by doubling section size.

**Frostburg State University, Gen Psych**
- A team of faculty, administrators and technology experts redesigned FSU’s General Psychology course, significantly increasing student performance while reducing instructional costs by 71%.

**Mississippi State University, Statics**
- Cost savings: ~25% per student
FULL IMPLEMENTATION RESULTS

43 Common Questions

- Full Implementation Redesign significantly better than Pilot Redesign & Traditional sections*

* A one-way ANOVA of section (3 total) on common question percentage was significant, $F = 25.852, p = .000, \eta^2 = .825.$
Impact on Learning: Pilot Phase

- **Parallel sections:** (spring 2009)
  - Control group: 2 traditional sections (57 students, 19% female)
  - Experimental group: 2 emporium sections (53 students, 19% female)
  - All four sections taught by the same instructor

- Number of assignments:
  - Traditional (8)
  - Emporium (24 + 6 with experiments)

- Number of tests/quizzes:
  - Traditional (3)
  - Emporium (7), one drop grade

- Success Rate (Grade of C or higher):
  - Traditional\(^a\) (49%)
  - Emporium\(^b\) (91%)

- **Assessment:**
  - Significant differences in assignment and test scores
  - Insignificant difference in final exam scores
  - Difference in success rates significant but influenced by grading system
  - Differences in prerequisite knowledge an important factor

---

\(^a\)Grading system: 15% assignments, 55% tests, 30% final exam
\(^b\)Grading system: 15% pre-emporium, 20% assignments, 40% quizzes, 25% final exam
Since first measured in 2003, the proportion of chief academic officers reporting that the learning outcomes for online compared to face-to-face as the ‘Same’, ‘Somewhat Superior’, and ‘Superior’ has increased from 57 percent to 68 percent.

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2006</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>0.6%</td>
<td>1.0%</td>
<td>1.8%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Somewhat superior</td>
<td>11.7%</td>
<td>10.0%</td>
<td>15.1%</td>
<td>12.4%</td>
</tr>
<tr>
<td>Same</td>
<td>44.9%</td>
<td>50.6%</td>
<td>45.0%</td>
<td>53.0%</td>
</tr>
<tr>
<td>Somewhat inferior</td>
<td>32.1%</td>
<td>28.4%</td>
<td>30.3%</td>
<td>23.0%</td>
</tr>
<tr>
<td>Inferior</td>
<td>10.7%</td>
<td>10.1%</td>
<td>7.8%</td>
<td>9.5%</td>
</tr>
</tbody>
</table>
GROWTH OF ONLINE LEARNING

Online Headcount Growth (~ 220%)
Minnesota State Colleges & Universities

<table>
<thead>
<tr>
<th>Year</th>
<th>Headcount</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2004</td>
<td>23,849</td>
<td></td>
</tr>
<tr>
<td>FY2005</td>
<td>29,974</td>
<td>26%</td>
</tr>
<tr>
<td>FY2006</td>
<td>40,616</td>
<td>36%</td>
</tr>
<tr>
<td>FY2007</td>
<td>52,282</td>
<td>29%</td>
</tr>
<tr>
<td>FY2008</td>
<td>65,982</td>
<td>26%</td>
</tr>
<tr>
<td>FY2009 (est.)</td>
<td>77,075</td>
<td>17%</td>
</tr>
</tbody>
</table>
GROWTH OF ONLINE LEARNING

UIS Online & Blended Enrollment

University of Illinois at Springfield
GROWTH OF ONLINE LEARNING

Western Carolina University, January 2010
“It is now projected that the e-Learning market will hit $52.6 Billion by 2010.”
-Campus Technology, August 2007
-Report by Global Industry Analysts
“The future, according to some scientists, will be exactly like the past, only far more expensive.”

John Sladek
The Big Switch

Edison and his Generator
THE BIG SWITCH

Tesla and his Generator
THE BIG SWITCH

“Microsoft”  “Google”
"Cloud computing ... has all the earmarks of a disruptive innovation: It is enterprise technology packaged to best fit the needs of small businesses and start-ups -- not the enterprise."

- James Staten, Forrester Research

Thanks to Simon Wardley
Dear Customers,

Managing a digital music collection is a bit of a mess. It’s possible to buy music from your phone, but then it might get stuck there. It’s possible to buy music from your work computer, but then you have to remember to transfer it to your home computer. Most people just wait until they get home and do their purchasing from there. What’s more, if you’re not regularly backing up your music collection, you can lose it with a disk drive crash.

We’re solving those problems today with two important new offerings: Amazon Cloud Drive and Amazon Cloud Player. **Cloud Drive** is your personal disk drive in the cloud. Anything you put in Cloud Drive is robustly stored in Amazon’s datacenters. You can upload your music collection to Cloud Drive, as well as any other digital documents.

**Cloud Player** comes in two varieties: Web and Android. All you need is a computer with a web browser and you can listen to your music with Cloud Player for Web — no software to install – just a web browser. The Android version is an app that lets you do the same thing from your Android phone or tablet.

Combined, these services allow you to store your music worry-free in the cloud and enjoy it anywhere. When you buy any of the 15 million songs in the Amazon MP3 Store, you’ll now see a new option to play or purchase directly into your Cloud Drive.

To start, we’re giving you 5 GB of free Cloud Drive storage. Plus, new purchases from the Amazon MP3 Store are stored for free and do not count against your storage quota.

We’re excited to offer you the ability to buy anywhere, play anywhere, and keep your music in one place.

Enjoy and happy listening,

Jeff Bezos
Founder & CEO
Performance gains with copper continue to be realized

- 100 Mb / 1 Gb / 10 Gb

Copper vs. Optical Fiber

- 10%+ annual growth for Fiber through 2012
- strong demand for advanced IT and emerging multimedia services

FTTH “Fiber to the Home”
“Unlike the current World Wide Web, the ‘Great Global Grid’ will be primarily a visual medium.”

Michael Malone
“Internet II: Re-booting America”
At just under 44 exabytes per month, the annual run rate of traffic in late 2012 will be 522 exabytes per year. A zettabyte, or 1,000 exabytes, will be the new milestone to look for beyond 2012.
THE NETWORK

1998

Toll
$270

2010

Toll
$0.05

COST TO STREAM A TWO-HOUR MOVIE

15¢ per MB in 1998 vs. 3¢ per GB in 2010
THREE WAVES OF VIDEO

- Phase 1: Growth of Internet video as viewed on the PC
- Phase 2: A rise in Internet delivery of video to the TV
- Phase 3: A surge in video communications
INTERNET TELEVISION
CUT THE CORD

- Wireless LAN (Wi-Fi)
  - In 2000: $400 M
  - In 2012: $12 B
  - Today: 30+ million Wi-Fi networks

- Total Wireless Economy:
  - $500 B (services, infrastructure, software, hardware, etc.)
  - 43% of internet homes are networked

- Wi-Max, 4G, Bluetooth, RFID, Zigbee, WHDI, and others

- The era of “Personal Broadband” is beginning in the US
SMART PHONES VS. PCS

Smartphone Sales To Beat PC Sales By 2011

Source: RBC Capital Markets estimates
AUGMENTED REALITY
AUGMENTED REALITY
AUGMENTED REALITY
AUGMENTED REALITY
Real time computer graphics, overlaid on and registered with the actual repaired equipment, can improve the productivity, accuracy, and safety of maintenance personnel.
Advances in augmented reality tools and applications will change the way we live, work, learn, and play.
PROJECTOR IN MY POCKET
Pico projector + eye-tracking camera = unique heads-up display.
WHAT ABOUT 3D?
3D PRODUCTION

Dual Lens Stereoscopic Camera
Adobe 3D Capable Software
3D PRODUCTION

Professional and Prosumer Camera Options
3D DISPLAY SALES

![Graph showing the growth of 3D display units and revenues from 2008 to 2018. The units show a steady increase, while the revenues increase significantly from $0.5B in 2008 to $25B in 2018.]
VIRTUAL REALITY
Still a few years away: 2015 – 2019 is the most likely prognosis
RISE OF THE TEACHING MACHINE
RISE OF THE TEACHING MACHINE
Adaptive Learning for Organizations

Power smart, scalable training and assessments with Knewton’s open platform.
Irene Bloom, lecturer in math at Arizona State U., shows off Knewton, new adaptive-learning software that gives students immediate feedback based on what they've learned.
MOORE’S LAW

Moore’s Law
The Fifth Paradigm

Logarithmic Plot

Calculations per Second per $1,000

Electromechanical Relay Vacuum Tube Transistor Integrated Circuit

Year

By 2029, sufficient computation to simulate the entire human brain, which I estimate at about $10^{16}$ (10 million billion) calculations per second (cps), will cost about a dollar.

- Ray Kurzweil,
  Foreword to “The Intelligent Universe” by James Gardner
WHO’S IN JEOPARDY?
Mark S. Valenti
President & CEO
The Sextant Group, Inc.

mvalenti@thesextantgroup.com

THANKS!