Higher Education’s Digital Future

“Men’s courses will foreshadow certain ends…”

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“There are more people in the world than ever before, and a far greater part of them want an education. The demand cannot be met simply by building more schools and training more teachers. Education must become more efficient. To this end curricula must be realized and simplified, and textbooks and classroom techniques improved. In any other field a demand for increased production would have led at once to the invention of labor-saving capital equipment. Education has reached this stage very late, possibly through a misconception of its task. Thanks to the advent of technology…These tools are finding their way into American schools and colleges...

allowing each student to proceed at his own pace
to receive immediate feedback
to play an active role [where] there is constant interchange between program and student
to have access to charts, maps, graphs, models…”


Sidney Pressey designed his own teaching machine in the 1920s at Ohio State University.

Edward Thorndyke developed the design for a teaching machine in 1912 at Teachers College.
Predicting what will happen in the future is easy. 

When it will happen is the hard part!
How We Got to Here?

**Timeline**

- **1990s**  
  The 1\(^{st}\) Wave

- **2000**  
  The 2\(^{nd}\) Wave

- **2008**  
  The 3\(^{rd}\) Wave

- **2014**  
  The 4\(^{th}\) Wave
The 1st Wave – 1990s

• Model – Traditional Distance Education – Access and Pedagogy

  ALN (Asynchronous Learning Network) / Largely Text-Based

• Key Question: How do you teach online?

• Research – Case studies and evaluations
The 2nd Wave – Early 2000s to 2008

- Model – Pedagogical
  Blended Learning
  Social and Multi-Media/Open Resources Evolve

- Key Question: How do we blend online learning techniques into mainstream classrooms?

- Research – Plethora of studies using different methodologies culminating in the USDOE meta-analysis (2010)
The 3rd Wave – 2008 to 2013/14

• Model – Access/Cost Benefit MOOC Model
• Key Question: Are MOOCs viable for teaching tens of thousands of students?
• Research – San Jose State University Study (2013)
The 4th Wave – 2014 →

- Model – Reconciliation of the 2nd Wave Pedagogical/Blended Learning & 3rd Wave Access/MOOC Models
- Key Question: How do we integrate the best of the Blended and MOOC models?
- Research: This is evolving and is focusing on a variety of pedagogical, student, faculty, outcomes, and access issues PLUS:
  1. big data and learning analytics
  2. adaptive or differentiated learning
  3. expansion of competency-based instruction
  4. open educational resources (OER)
  5. interactive media (games, simulations, multiuser virtual environments)
  6. mobile technology
Drew Faust, the president of Harvard University, in a message to the World Economic Forum in 2015, described three major forces that will shape the future of higher education:

- the influence of technology
- the changing shape of knowledge
- the attempt to define the value of education.

“So much of what humanity has achieved has been sparked and sustained by the research and teaching that take place every day at colleges and universities, sites of curiosity and creativity that nurture some of the finest aspirations of individuals and, in turn, improve their lives—and their livelihoods. As the landscape continues to change, we must be careful to protect the ideals at the heart of higher education, ideals that serve us all well as we work together to improve the world.” (Faust, 2015)
The 5th Wave – 2020s →

Five Scenarios

2. Ryan Craig (2015). *College Disrupted...*

Who is right?

They are all right to some extent but there is very little to indicate that there will be a mass disruption of colleges. The vast majority of the institutions that exist today will exist through the 2020s. The major disruption will not be the technology but possibly a major change in education policy such as the perceived value of a college education vs. tuition-free public higher education.
The 5th Wave – 2020s →

Online Learning Technologies Continue to Evolve and Augmented by
1. Nanotechnology – billionths of a meter or the size of five carbon atoms.
2. Early Artificial Intelligence – Amazon Alexa/Apple Siri Will Evolve
3. Massive Cloud Computing – move from low cloud (i.e. email) applications to mission-critical applications (i.e., financial, personnel, student databases)
4. Low Cost/High Quality Digital Media and Animation – Lucasfilms Starwars: Rogue 1
2030s and Beyond…..

New Technologies

1. Quantum Computing – gigabytes ($10^9$) and terabytes ($10^{12}$) will give way to zettabytes ($10^{21}$) and yottabytes ($10^{24}$)

2. Computing and the Mind (Biosensing)
   - Neuroprostheses
   - Brainnets
   - Nanobots

3. Superclouds – Watson + Big Brother

4. Robotics – Alexa and Siri Fully Formed

5. Fully Developed Artificial Intelligence Applications
Technology Forces Shaping the Future of Man-Machine Interfacing

Super Cloud

Artificial Intelligence

Robotics

Biosensing Devices

Nanotechnology and Quantum Computing
Stephen Hawking (2014):

“I think the development of full artificial intelligence could spell the end of the human race. Once humans develop artificial intelligence, it will take off on its own and design itself at an ever-increasing rate.”

(Holley, 2014)
Charles Dickens (1843)

In *A Christmas Carol* by Charles Dickens, the miserly Ebenezer Scrooge is visited on Christmas Eve by the ghost of his former business partner Jacob Marley as well as the Ghosts of Christmases Past, Present, and Future. The visit to the future ends as Scrooge faces his own mortality in the form of a tombstone inscribed with his name. He asks the Ghost:

“Before I draw nearer to that stone to which you point, answer me one question. Are these the shadows of the things that Will be, or are they shadows of things that May be..?”

The Ghost continued to point downward to the grave by which it stood.

“Men’s courses will foreshadow certain ends, to which, if persevered in, they must lead,” said Scrooge. “But if the courses be departed from, the ends will change. Say it is thus with what you show me!” (Dickens, 1843)
Recommendations

• Test / Experiment with the technology.

• Use / Improve that which works.

• Discard that which does not work.

• Whatever you do, do not ignore it.
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