Education Automation Now and in the Future

CJ Fearnley
cjf@SynergeticsCollaborative.org
http://www.SynergeticsCollaborative.org
cjf@CJFearnley.com
http://blog.CJFearnley.com

28 September 2012

Presentation to ***ReVIEWING Black Mountain College 4:*** *Looking Forward at Buckminster Fuller's Legacy* at the University of North Carolina at Asheville

On-line version of this presentation:
http://www.CJFearnley.com/Asheville.Education.Automation.pdf

My Background

- I earned a BA in Mathematical Sciences and Philosophy from Binghamton University in 1989. But knowledge has changed so much in 25 years that I'm enjoying an educational refresh using free on-line video courses!
- My involvement in the Synergetics Collaborative which is an educational and scientific non-profit makes me an educator of sorts. But I see myself mostly as a student. I have "taken" 18 on-line video courses in 5 years.
- The next Synergetics Collaborative event will be the Fourth Biennial Design Science Symposium at RISD on the theme of Bridging Morphology, Biomimicry, Sustainability, and Synergetics to be held in February 2014 in Providence, RI.

My Background

- I earned a BA in Mathematical Sciences and Philosophy from Binghamton University in 1989. But knowledge has changed so much in 25 years that I'm enjoying an educational refresh using free on-line video courses!
- My involvement in the Synergetics Collaborative which is an educational and scientific non-profit makes me an educator of sorts. But I see myself mostly as a student. I have "taken" 18 on-line video courses in 5 years.
- The next Synergetics Collaborative event will be the Fourth Biennial Design Science Symposium at RISD on the theme of Bridging Morphology, Biomimicry, Sustainability, and Synergetics to be held in February 2014 in Providence, RI.

My Background

- I earned a BA in Mathematical Sciences and Philosophy from Binghamton University in 1989. But knowledge has changed so much in 25 years that I'm enjoying an educational refresh using free on-line video courses!
- My involvement in the Synergetics Collaborative which is an educational and scientific non-profit makes me an educator of sorts. But I see myself mostly as a student. I have "taken" 18 on-line video courses in 5 years.
- The next Synergetics Collaborative event will be the Fourth Biennial Design Science Symposium at RISD on the theme of Bridging Morphology, Biomimicry, Sustainability, and Synergetics to be held in February 2014 in Providence, RI.

The Open Educational Resources (OER) Movement

- Open Educational Resources (OER) are freely usable, re-usable and modifiable on-line educational materials. The Internet makes video and audio effective ways to deliver education. Also, lecture notes, assignments, textbooks, exams, etc.
- The OER movement is an Internet-powered expansion of the practice of students and teachers sharing materials.
- The wikipedia entry has many more details:
  `http://en.wikipedia.org/wiki/Open_educational_resources`
- My essay "Buckminster Fuller and the Open Educational Resources Movement" (2010) has more thoughts:
  `http://blog.cjfearnley.com/2010/10/26/buckminster-fuller-and-the-oer-movement/`

The Open Educational Resources (OER) Movement

- Open Educational Resources (OER) are freely usable, re-usable and modifiable on-line educational materials. The Internet makes video and audio effective ways to deliver education. Also, lecture notes, assignments, textbooks, exams, etc.
- The OER movement is an Internet-powered expansion of the practice of students and teachers sharing materials.
- The wikipedia entry has many more details:
  `http://en.wikipedia.org/wiki/Open_educational_resources`
- My essay "Buckminster Fuller and the Open Educational Resources Movement" (2010) has more thoughts:
  `http://blog.cjfearnley.com/2010/10/26/buckminster-fuller-and-the-oer-movement/`

The Open Educational Resources (OER) Movement

- Open Educational Resources (OER) are freely usable, re-usable and modifiable on-line educational materials. The Internet makes video and audio effective ways to deliver education. Also, lecture notes, assignments, textbooks, exams, etc.
- The OER movement is an Internet-powered expansion of the practice of students and teachers sharing materials.
- The wikipedia entry has many more details:

  `http://en.wikipedia.org/wiki/Open_educational_resources`
- My essay "Buckminster Fuller and the Open Educational Resources Movement" (2010) has more thoughts:

  `http://blog.cjfearnley.com/2010/10/26/buckminster-fuller-and-the-oer-movement/`

CapeTown Open Education Declaration

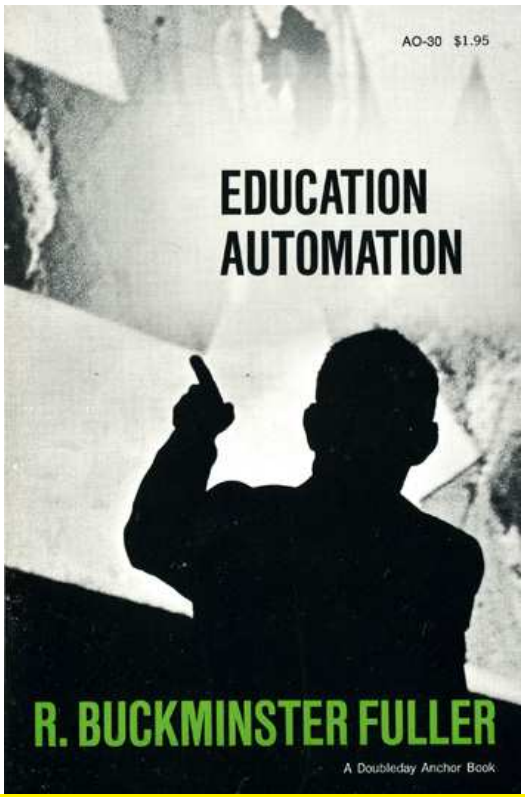
"We are on the cusp of a global revolution in teaching and learning. Educators worldwide are developing a vast pool of educational resources on the Internet, open and free for all to use. These educators are creating a world where each and every person on earth can access and contribute to the sum of all human knowledge. They are also planting the seeds of a new pedagogy where educators and learners create, shape and evolve knowledge together, deepening their skills and understanding as they go."

CapeTown Open Education Declaration, 2007

`http://www.capetowndeclaration.org/read-the-declaration`

Introduction to Education Automation

- Buckminster Fuller's short book Education Automation, a transcript of a 22 April 1961 lecture, was published in 1962.
- It preceded J. C. R. Licklider's memos on computer networks in August 1962.



Introduction to Education Automation (continued)

- I am amazed at how prescient Bucky was in anticipating what has become the Open Educational Resources (OER) movement.
- This talk will discuss six (6) of Bucky's key visions from his book and look at the OER movement as a present-day embodiment of that vision.
- Buckminster Fuller is, in my view, one of the conceptual founding fathers of the OER movement.
- The future that Bucky envisioned is now!

Introduction to Education Automation (continued)

- I am amazed at how prescient Bucky was in anticipating what has become the Open Educational Resources (OER) movement.
- This talk will discuss six (6) of Bucky's key visions from his book and look at the OER movement as a present-day embodiment of that vision.
- Buckminster Fuller is, in my view, one of the conceptual founding fathers of the OER movement.
- The future that Bucky envisioned is now!

Introduction to Education Automation (continued)

- I am amazed at how prescient Bucky was in anticipating what has become the Open Educational Resources (OER) movement.
- This talk will discuss six (6) of Bucky's key visions from his book and look at the OER movement as a present-day embodiment of that vision.
- Buckminster Fuller is, in my view, one of the conceptual founding fathers of the OER movement.
- The future that Bucky envisioned is now!

Introduction to Education Automation (continued)

- I am amazed at how prescient Bucky was in anticipating what has become the Open Educational Resources (OER) movement.
- This talk will discuss six (6) of Bucky's key visions from his book and look at the OER movement as a present-day embodiment of that vision.
- Buckminster Fuller is, in my view, one of the conceptual founding fathers of the OER movement.
- The future that Bucky envisioned is now!

The BIG Problem of Education

- "We know our world population is increasing incomprehendibly swiftly. There are enormous numbers to be educated."
  — R. Buckminster Fuller, Education Automation
- 80 million more people per year = 152 more per minute = 2.5 more every second. Billions more people can be expected. Unprecedented population growth.
- 1.9 billion children under 15 (the largest cohort ever!) currently represents 27% of world population

  http://www.gapminder.org/news/world-peak-number-of-children-is-now/
- 6.7% of the worlds population has a college degree. "Since 1950, the average number of years of schooling for people 15 and older has more than doubled to 7.76."

  http://www.sfgate.com/business/article/6-7-of-world-population-has-a-college-degree-31
- 70% of the global population does not attend college.

The BIG Problem of Education

- "We know our world population is increasing incomprehendibly swiftly. There are enormous numbers to be educated."
  — R. Buckminster Fuller, Education Automation
- 80 million more people per year = 152 more per minute = 2.5 more every second. Billions more people can be expected. Unprecedented population growth.
- 1.9 billion children under 15 (the largest cohort ever!) currently represents 27% of world population

  http://www.gapminder.org/news/world-peak-number-of-children-is-now/
- 6.7% of the worlds population has a college degree. "Since 1950, the average number of years of schooling for people 15 and older has more than doubled to 7.76."

  http://www.sfgate.com/business/article/6-7-of-world-population-has-a-college-degree-31
- 70% of the global population does not attend college.

The BIG Problem of Education

- "We know our world population is increasing incomprehendibly swiftly. There are enormous numbers to be educated."
  — R. Buckminster Fuller, Education Automation
- 80 million more people per year = 152 more per minute = 2.5 more every second. Billions more people can be expected. Unprecedented population growth.
- 1.9 billion children under 15 (the largest cohort ever!) currently represents 27% of world population

  `http://www.gapminder.org/news/world-peak-number-of-children-is-now/`
- 6.7% of the worlds population has a college degree. "Since 1950, the average number of years of schooling for people 15 and older has more than doubled to 7.76."

  `http://www.sfgate.com/business/article/6-7-of-world-population-has-a-college-degree-31`
- 70% of the global population does not attend college.

The BIG Problem of Education (continued)

- "The big question is how are we, as educators, going to handle the enormous increase in the new life? How do we make available to these new students what we have been able to discover fairly accurately about the Universe and the way it is operating? How are we going to be able to get to them the true net value won blindly through the long tradition of ignorant dedications and hard-won lessons of all the unknown mothers and all the other invisibly heroic people who have given hopefully to the new life, such as, the fabulous heritage of men's stoic capacity to carry on despite immense hardships?"
  — R. Buckminster Fuller, Education Automation
- Millions of people are already using free OER resources. It can scale to service billions!

The BIG Problem of Education (continued)

- "The big question is how are we, as educators, going to handle the enormous increase in the new life? How do we make available to these new students what we have been able to discover fairly accurately about the Universe and the way it is operating? How are we going to be able to get to them the true net value won blindly through the long tradition of ignorant dedications and hard-won lessons of all the unknown mothers and all the other invisibly heroic people who have given hopefully to the new life, such as, the fabulous heritage of men's stoic capacity to carry on despite immense hardships?"
  — R. Buckminster Fuller, Education Automation
- Millions of people are already using free OER resources. It can scale to service billions!

The BIG Problem of Education (continued)

- "Unless the new life is highly appreciative of those who have gone before, it won't be able to take advantage of its heritage."
  — R. Buckminster Fuller, Education Automation
- Can OER help preserve and propagate Humanity's vast cultural heritage?

The BIG Problem of Education (continued)

- "Unless the new life is highly appreciative of those who have gone before, it won't be able to take advantage of its heritage."
  — R. Buckminster Fuller, Education Automation
- Can OER help preserve and propagate Humanity's vast cultural heritage?

A Vision of Video Education

- "I have taken photographs of my grandchildren looking at television. Without consideration of the 'value,' the actual concentration of a child on the message which is coming to him is fabulous. They really 'latch on.' . . . I am quite certain we are soon going to begin to do the following: At our universities we will take the faculty leaders in research or in teaching. We are not going to ask them to give the same lectures over and over each year from their curriculum cards. . . . They will give their basic lecture course just once to a group of human beings, including both the experts in their own subject and bright children and adults without special training in their field."
  — R. Buckminster Fuller, Education Automation
- I particularly value OER video courses for their edutainment value. Even if I do not care to master the details, I get a feeling for the subject. I can stop and rewind the video to reflect or take detailed notes when my interests or needs require it.

A Vision of Video Education

- "I have taken photographs of my grandchildren looking at television. Without consideration of the 'value,' the actual concentration of a child on the message which is coming to him is fabulous. They really 'latch on.' . . . I am quite certain we are soon going to begin to do the following: At our universities we will take the faculty leaders in research or in teaching. We are not going to ask them to give the same lectures over and over each year from their curriculum cards. . . . They will give their basic lecture course just once to a group of human beings, including both the experts in their own subject and bright children and adults without special training in their field."
  — R. Buckminster Fuller, Education Automation
- I particularly value OER video courses for their edutainment value. Even if I do not care to master the details, I get a feeling for the subject. I can stop and rewind the video to reflect or take detailed notes when my interests or needs require it.

A Vision of Video Education (continued)

- "I am quite sure we are going to get research and development laboratories of education where the faculty will become producers of extraordinary moving-picture documentaries. That is going to be the big, new educational trend."
  — R. Buckminster Fuller, Education Automation
- Fuller's prognostication of subject matter experts preparing videos has come to fruition with the advent of the OER movement! Top professors are rushing to get their pet courses on-line to influence students around the world!

A Vision of Video Education (continued)

- "I am quite sure we are going to get research and development laboratories of education where the faculty will become producers of extraordinary moving-picture documentaries. That is going to be the big, new educational trend."
  — R. Buckminster Fuller, Education Automation
- Fuller's prognostication of subject matter experts preparing videos has come to fruition with the advent of the OER movement! Top professors are rushing to get their pet courses on-line to influence students around the world!

Education as the major world industry

- "Our education processes are in fact the upcoming major world industry. . . . I would say, then, that you are faced with a future in which education is going to be number one amongst the great world industries, within which will flourish an educational machine technology that will provide tools such as the individually selected and articulated two-way TV and an intercontinentally networked, documentaries call-up system . . ."
  — R. Buckminster Fuller, Education Automation
- Bucky anticipated the importance of global information networks! Now 50 years later, Fuller's vision is spontaneously emerging using the Internet instead of two-way TV.

Education as the major world industry

- "Our education processes are in fact the upcoming major world industry. . . . I would say, then, that you are faced with a future in which education is going to be number one amongst the great world industries, within which will flourish an educational machine technology that will provide tools such as the individually selected and articulated two-way TV and an intercontinentally networked, documentaries call-up system . . ."
  — R. Buckminster Fuller, Education Automation
- Bucky anticipated the importance of global information networks! Now 50 years later, Fuller's vision is spontaneously emerging using the Internet instead of two-way TV.

Research and development in education

- "As we now disemploy men as muscle and reflex machines, the one area where employment is gaining abnormally fast is the research and development area. Research and development are a part of the educational process itself. We are going to have to invest in our people and make available to them participation in the great educational process of research and development in order to learn more. When we learn more, we are able to do more with our given opportunities."
  — R. Buckminster Fuller, Education Automation
- Wouldn't school be so much more engaging if we applied our knowledge to build and discover new things as an integral part of an R&D process?
- Witness:
  `http://www.wired.com/wiredscience/2010/12/kids-study-bees/`

Research and development in education

- "As we now disemploy men as muscle and reflex machines, the one area where employment is gaining abnormally fast is the research and development area. Research and development are a part of the educational process itself. We are going to have to invest in our people and make available to them participation in the great educational process of research and development in order to learn more. When we learn more, we are able to do more with our given opportunities."
  — R. Buckminster Fuller, Education Automation
- Wouldn't school be so much more engaging if we applied our knowledge to build and discover new things as an integral part of an R&D process?
- Witness:

  `http://www.wired.com/wiredscience/2010/12/kids-study-bees/`

The importance of unlearning

- ". . . to discover whether the capable student is able to unlearn everything he has learned, . . . experience has shown that that is what he is going to have to do if he is to become a front-rank scientist. The frontiers of science are such that almost every morning many of our hypotheses of yesterday are found inadequate or in error. So great is the frontier acceleration that now in a year of such events much of yesterday's conceptioning becomes obsolete."
  — R. Buckminster Fuller, Education Automation
- The unlearning process is vital to human affairs as it can help allay the negative effects of a "hardening of the categories" which can blind us to deeper previously undiscovered realities.

The importance of unlearning

- ". . . to discover whether the capable student is able to unlearn everything he has learned, . . . experience has shown that that is what he is going to have to do if he is to become a front-rank scientist. The frontiers of science are such that almost every morning many of our hypotheses of yesterday are found inadequate or in error. So great is the frontier acceleration that now in a year of such events much of yesterday's conceptioning becomes obsolete."
  — R. Buckminster Fuller, Education Automation
- The unlearning process is vital to human affairs as it can help allay the negative effects of a "hardening of the categories" which can blind us to deeper previously undiscovered realities.

The future of education is Individual Education

- "I think . . . primarily the individual is going to study at home. . . . I am quite sure that the students of all ages will keep on going to 'school houses' to get social experiences — to be 'baby-sat.' . . . Real education, will be something to which individuals will discipline themselves spontaneously under the stimulus of their individually unique chromosomes . . . No two people have the same appetite at the same time. . . . Simultaneous curricula are obsolete."
  — R. Buckminster Fuller, Education Automation
- I deeply agree with Bucky about individual education.
- Although I prefer archived courses in many ways over simultaneous curricula such as `Coursera.org` and `EdX.org`. Education and learning is really a deeply social process and simultaneous courses are more engaging (a cohort of peers, deadlines, extra faculty attention, etc.).

The future of education is Individual Education

- "I think . . . primarily the individual is going to study at home. . . . I am quite sure that the students of all ages will keep on going to 'school houses' to get social experiences — to be 'baby-sat.' . . . Real education, will be something to which individuals will discipline themselves spontaneously under the stimulus of their individually unique chromosomes . . . No two people have the same appetite at the same time. . . . Simultaneous curricula are obsolete."
  — R. Buckminster Fuller, Education Automation
- I deeply agree with Bucky about individual education.
- Although I prefer archived courses in many ways over simultaneous curricula such as `Coursera.org` and `EdX.org`. Education and learning is really a deeply social process and simultaneous courses are more engaging (a cohort of peers, deadlines, extra faculty attention, etc.).

My first OER Video Course: Financial Markets

- Since 2008, I've "taken" 18 OER video courses.
- ECON 252: Financial Markets, Spring 2008, Robert Shiller, Yale `http://oyc.yale.edu/economics/econ-252-08`
  2011 version: `http://oyc.yale.edu/economics/econ-252-11`
  - Rober Shiller is the "Shiller" in the Case-Shiller Home Price Indices
  - I unlearned that government is an impediment to business; instead, I learned that contract law is the basis for business.
  - I treated the course as "edutainment", so I want to take the new 2011 version to try to understand the subject in more depth (and learn more about the financial crisis from this leading economist).

My first OER Video Course: Financial Markets

- Since 2008, I've "taken" 18 OER video courses.
- ECON 252: Financial Markets, Spring 2008, Robert Shiller, Yale `http://oyc.yale.edu/economics/econ-252-08`
  2011 version: `http://oyc.yale.edu/economics/econ-252-11`
  - Rober Shiller is the "Shiller" in the Case-Shiller Home Price Indices
  - I unlearned that government is an impediment to business; instead, I learned that contract law is the basis for business.
  - I treated the course as "edutainment", so I want to take the new 2011 version to try to understand the subject in more depth (and learn more about the financial crisis from this leading economist).

MIT 8.01 Physics I: Classical Mechanics

- MIT 8.01 Physics I: Classical Mechanics, Fall 1999, Walter Lewin

  `http://ocw.mit.edu/courses/physics/8-01-physics-i-classical-mechanics-fall-1999/`

  Scholar Course version:

  `http://ocw.mit.edu/courses/physics/8-01sc-physics-i-classical-mechanics-fall-2010/`

  - I saw an article in the New York Times about this course: it helped inspire me to replace TV with Internet video.
  - Lewin says he spent about 40 hours preparing each lecture: it shows, they are exquisite!
  - He demonstrates every principle he teaches so you get a tactile feel for the physics (it is MIT: so he covers the math in depth too).
  - I treated the course as "edutainment" and did not master the material (I took calc-based physics in college, but it has long since been mostly forgotten).

MIT 18.06 Linear Algebra

- MIT 18.06 Linear Algebra, Spring 2010, Gilbert Strang

  `http://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010`

  Scholar Course version:

  `http://ocw.mit.edu/courses/mathematics/18-06sc-linear-algebra-fall-2011`

  My Review:

  `http://blog.cjfearnley.com/2011/04/15/study-linear-algebra-at-mit-with-gilbert-strang`

  - Linear Algebra is, perhaps, the most important and most useful of the college-level math courses available.
  - This was the first course I studied in depth taking 2+ final exams, quizzes and doing homeworks (even though I did well in my college Linear Algebra course: it was 20+ years before and needed serious refreshing).

Physics C10/LS C70V: Physics for future Presidents

- Physics C10/LS C70V: Physics for future Presidents AKA Descriptive Introduction to Physics, Spring 2008 (link is for Fall 2010), Richard Muller, Berkeley

  `http://www.youtube.com/view_play_list?p=810FF8DB5EB87B5F`

  My review:

  `http://blog.cjfearnley.com/2011/02/24/the-most-important-video-course-on-line-physics-`

  - Muller explains physics in terms even a President can understand (no advanced math). The course focuses on socially important issues such as energy, radioactivity, nukes, electricity & magnetism, gravity, satellites, orbits, space, waves, light, global warming, etc.
  - I unlearned that radioactivity is so dangerous. It is dangerous, but not as dangerous as most of us think.
  - I watched the Spring 2008 version which is no longer on-line (I have a copy, but it is not yet on-line).

EEB 122: Principles of Evolution, Ecology and Behavior

- EEB 122: Principles of Evolution, Ecology and Behavior, Spring 2009, Stephen Stearns, Yale
  `http://oyc.yale.edu/ecology-and-evolutionary-biology/eeb-122`
  My review:
  `http://blog.cjfearnley.com/2011/08/23/a-big-picture-conceptual-introduction-to-biology`
  - I unlearned that "survival of the fittest" is valid. Stearns says the concept wasn't even part of Darwin's first edition of *On the Origin of Species*, it was introduced by Herbert Spencer, and it is wrong.
  - Stearns is a big picture thinker and he connects life to all the atoms in Universe and discusses the big picture of geology and ecology. See my review for details.

ESS 15 Blue Planet: Introduction to Oceanography

- ESS 15 Blue Planet: Introduction to Oceanography, UCLA
  `http://www.youtube.com/view_play_list?p=86F7D2B9DFC5E52F`
  - $\frac{3}{4}$ of Earth is water. The oceans generate our weather and our climate? But how? This course covers the basics very nicely.
  - I learned that plate tectonics was controversial until we saw what was under the oceans. We still haven't explored the oceans to a significant degree.
  - This course is very good edutainment as the pace is slow enough that I didn't need to take many notes nor watch the videos twice.

ITAL 310: Dante in Translation

- ITAL 310: Dante in Translation, Fall 2008, Giuseppe Mazzotta, Yale

  `http://oyc.yale.edu/italian-language-and-literature/ital-310`

  My review:

  `http://blog.cjfearnley.com/2012/04/29/dantes-great-commedia-or-poetry-as-a-way-of-know`

  - A comprehensivist needs to study the Humanities as well! How else can you imagine bridging the sciences with the humanities?
  - Dante is a Big Picture . . . cosmic thinker. Bucky people would do well to know him.
  - To say that the Commedia is rich in a multidimensional way is an understatement. The Commedia is intricate, dramatic, thrilling, mind-blowing, cosmic, shocking, ineffable, sometimes oppressive, and altogether extraordinary.
  - I unlearned that there was no science in the middle ages: Beatrice describes an experiment.

MCDB 150: Global Problems of Population Growth

- MCDB 150: Global Problems of Population Growth, Spring 2009, Bob Wyman, Yale

  `http://oyc.yale.edu/molecular-cellular-and-developmental-biology/mcdb-150`

  - Wyman considers population growth from practically every imaginable perspective. It is a fascinating and unsettling presentation.
  - I unlearned that the correlation between energy production and population growth is significant (as Bucky asserted). Instead it seems that the fall in the death rate, fall in infant mortality, rise in per capita income (economic rise), literacy, urbanization, industrialization, and education (either female or male) all correlate with a decline in fertility. But correlation is not causation!!
  - The spontaneous, global, disapproved by both government and religion, transition from high fertility to low fertility is a profound mystery that has so far evaded all attempts by demographers to find its cause!

MIT 3.091 Introduction to Solid State Chemistry

- MIT 3.091 Introduction to Solid State Chemistry, Fall 2010, Donald Sadoway

  `http://ocw.mit.edu/courses/materials-science-and-engineering/3-091sc-introduction-to-s`

  - This is, perhaps, the most important course I took from the perspective of understanding how our physical world works: it is all explained by electronic structure!
  - The course is elementary and satisfies MIT's all college chemistry requirement, but it is at the MIT level (so it demands a lot of effort). I want to master it . . ..
  - Sadoway is a brilliant teacher who ties in the humanities and applications in his lectures. The course answers basic questions about how materials behave: it has a materials science perspective.

World History / World Civilization to 1500 CE

- W3902: World History to 1500 CE, Richard Bulliet, Columbia
  `http://www.youtube.com/view_play_list?p=49C7AA14331CFEF3`
  HIST 3379: World Civilization to 1500, Sally Vaughn, UHouston
  `http://www.youtube.com/view_play_list?p=32431938AF5F757F`
  - Bucky suggests that by speculatively looking deep into the past we can obtain leverage on the arc of history. So I am using these freely available courses to take a fresh look at our global history.
  - Bulliet makes me think by discussing how we understand and imagine history. He doesn't cover the facts of history in any breadth (maybe if I had read his book). But his perspective is very big picture.
  - Vaughn has done a brilliant job finding public domain artwork to illustrate her lectures. Her lecture notes provide good entry points for Wikipedia readings, so I can get a more complete coverage of the facts of history.

Model Thinking with Scott E. Page

- COMPLXSYS 391: Model Thinking, Coursera, U Michigan, Scott E. Page

  `http://www.modelthinker-class.org`

  My Review:

  `http://blog.cjfearnley.com/2012/06/14/the-importance-of-model-thinking`

  - Profound course with a strong Synergetics flavor.
  - See my talk on Sunday for more details!

The Art of Living, Stanford

- The Art of Living, R. Lanier Anderson, Kenneth Taylor, & Joshua Landy, Stanford

  `http://humanexperience.stanford.edu/artofliving`

  - Studies Plato's *Symposium*, Shakespeare's *Hamlet*, Kierkegaard's *Fear and Trembling*, Nietzsche's *The Gay Science*, and Morrison's *Song of Solomon* to gain insights into how to live life . . . "the art of living".
  - Each author suggests a highest value for your life: reason, authenticity, faith, art, and community.

MIT 18.02 Multivariable Calculus

- MIT 18.02 Multivariable Calculus, Denis Auroux

  `http://ocw.mit.edu/courses/mathematics/18-02-multivariable-calculus-fall-2007`

  Scholar Course:

  `http://ocw.mit.edu/courses/mathematics/18-02sc-multivariable-calculus-fall-2010`

  - I want to study advanced sciences but I've forgotten my Calculus from college.
  - Bucky is right that Calculus has some philsophical issues. But all models are partially wrong (even Bucky's). Calculus is a powerful tool that (despite its issues) gives excellent approximations that come close enough to truth for the purpose of standard engineering and more.

Computing for Data Analysis, Johns Hopkins

- Computing for Data Analysis, Roger D. Peng, Johns Hopkins, just started, 4 weeks

  `https://www.coursera.org/course/compdata`

  - The statistical revolution of the 20th century has transformed our understanding and practice of science. Moreover, we now have a data deluge. I want to understand statistics and the analysis of data more deeply.
  - This course is about the R programming language which is an advanced FOSS (free and open source software) tool for statistical programming.

Design: Creation of Artifacts in Society, UPenn

- Design: Creation of Artifacts in Society, Karl T. Ulrich, UPenn, Starts 22 October 2012 for 8 weeks

  `https://www.coursera.org/course/design`

  - I am very excited about this course! My Synergetics Collaborative colleagues, design professor, John Belt, and Amy Leidtke and her colleages at RISD have left me feeling ignorant about design given that my background consists of only one 3D design class from college 25 years ago.
  - So I plan to do a deep dive into this course!!! Join me!
  - I will be using Blender `http://www.blender.org` as my 3D modeling tool, because I insist on using FOSS (free and open source software) technology and it is reported to be excellent but difficult to master. So I will have my work cut out for me this fall!

Major OER Archives

- MIT OpenCourseWare:
  `http://ocw.mit.edu/courses/audio-video-courses`
- Yale Open Courses: `http://oyc.yale.edu`
- NPTEL (National Programme on Technology Enhanced learning): A Joint Venture of Indian Institutes of Technology (IIT) and The Indian Institute of Science: 269 video courses!
  `http://nptel.iitm.ac.in`
  YouTube: `http://www.youtube.com/nptelhrd`
- The University of Houston: `http://www.youtube.com/UHouston`
- University of California, Berkeley:
  `http://www.youtube.com/UCBerkeley`
- Khan Academy: `http://www.khanacademy.org`
- Connexions: `http://cnx.org`
- Coursera: `https://www.coursera.org`
- Udacity: `http://www.udacity.com`
- Edx: `http://www.edxonline.org`

Major OER Archives

- MIT OpenCourseWare: `http://ocw.mit.edu/courses/audio-video-courses`
- Yale Open Courses: `http://oyc.yale.edu`
- NPTEL (National Programme on Technology Enhanced learning): A Joint Venture of Indian Institutes of Technology (IIT) and The Indian Institute of Science: 269 video courses! `http://nptel.iitm.ac.in`
  YouTube: `http://www.youtube.com/nptelhrd`
- The University of Houston: `http://www.youtube.com/UHouston`
- University of California, Berkeley: `http://www.youtube.com/UCBerkeley`
- Khan Academy: `http://www.khanacademy.org`
- Connexions: `http://cnx.org`
- Coursera: `https://www.coursera.org`
- Udacity: `http://www.udacity.com`
- Edx: `http://www.edxonline.org`

Major OER Archives

- MIT OpenCourseWare:
  `http://ocw.mit.edu/courses/audio-video-courses`
- Yale Open Courses: `http://oyc.yale.edu`
- NPTEL (National Programme on Technology Enhanced learning): A Joint Venture of Indian Institutes of Technology (IIT) and The Indian Institute of Science: 269 video courses!
  `http://nptel.iitm.ac.in`
  YouTube: `http://www.youtube.com/nptelhrd`
- The University of Houston: `http://www.youtube.com/UHouston`
- University of California, Berkeley:
  `http://www.youtube.com/UCBerkeley`
- Khan Academy: `http://www.khanacademy.org`
- Connexions: `http://cnx.org`
- Coursera: `https://www.coursera.org`
- Udacity: `http://www.udacity.com`
- Edx: `http://www.edxonline.org`

Conclusion

- Bucky's vision for addressing the BIG problem of educating the worlds' billions with video education as a major industry is being fulfilled by the OER movement. It is now feasible to use OER resources to facilitate your unlearning and develop your personalized individual education from home. Just as Bucky envisioned it!
- So join the movement!
- Make your educational materials accessible on the Internet with a license that supports re-use and modification.
- Take courses to become a comprehensivist, to learn how the world works, build your generalist and tactical skills so you can contribute to making civilization work better.
- I can be your OER guidance counselor: feel free to contact me for help finding some good courses.

Conclusion

- Bucky's vision for addressing the BIG problem of educating the worlds' billions with video education as a major industry is being fulfilled by the OER movement. It is now feasible to use OER resources to facilitate your unlearning and develop your personalized individual education from home. Just as Bucky envisioned it!
- So join the movement!
- Make your educational materials accessible on the Internet with a license that supports re-use and modification.
- Take courses to become a comprehensivist, to learn how the world works, build your generalist and tactical skills so you can contribute to making civilization work better.
- I can be your OER guidance counselor: feel free to contact me for help finding some good courses.

Conclusion

- Bucky's vision for addressing the BIG problem of educating the worlds' billions with video education as a major industry is being fulfilled by the OER movement. It is now feasible to use OER resources to facilitate your unlearning and develop your personalized individual education from home. Just as Bucky envisioned it!
- So join the movement!
- Make your educational materials accessible on the Internet with a license that supports re-use and modification.
- Take courses to become a comprehensivist, to learn how the world works, build your generalist and tactical skills so you can contribute to making civilization work better.
- I can be your OER guidance counselor: feel free to contact me for help finding some good courses.

Conclusion

- Bucky's vision for addressing the BIG problem of educating the worlds' billions with video education as a major industry is being fulfilled by the OER movement. It is now feasible to use OER resources to facilitate your unlearning and develop your personalized individual education from home. Just as Bucky envisioned it!
- So join the movement!
- Make your educational materials accessible on the Internet with a license that supports re-use and modification.
- Take courses to become a comprehensivist, to learn how the world works, build your generalist and tactical skills so you can contribute to making civilization work better.
- I can be your OER guidance counselor: feel free to contact me for help finding some good courses.

Conclusion

- Bucky's vision for addressing the BIG problem of educating the worlds' billions with video education as a major industry is being fulfilled by the OER movement. It is now feasible to use OER resources to facilitate your unlearning and develop your personalized individual education from home. Just as Bucky envisioned it!
- So join the movement!
- Make your educational materials accessible on the Internet with a license that supports re-use and modification.
- Take courses to become a comprehensivist, to learn how the world works, build your generalist and tactical skills so you can contribute to making civilization work better.
- I can be your OER guidance counselor: feel free to contact me for help finding some good courses.

Thank You

Thank You!

Any Questions?

On-line version of this presentation:
`http://www.CJFearnley.com/Asheville.Education.Automation.pdf`