

Buckminster Fuller and the Open Educational Resources Movement



Posted on 26 October 2010 by [cjf](#)

For the past couple of years, [Jeannie](#) and I have been engaged as students using so-called “open educational resources” (OER). We’ve “taken” a number of courses at [MIT’s OpenCourseWare \(OCW\)](#), [OpenYaleCourses](#) as well as dabbling in material from numerous other schools around the Internet.

I first read Buckminster Fuller’s short book [Education Automation](#) many years ago. I was amazed at Fuller’s foresight in advocating so much of what has now become the OER movement. Then a week ago I led a [Ben Franklin Thinking Society](#) discussion on [Buckminster Fuller and the Open Educational Resources Movement](#). Here are my reflections on what I learned from preparing and participating in that discussion.

The Open Educational Resources (OER) Movement

The OER movement is simply an Internet-powered expansion of the time-honored practice of students and teachers sharing materials and ideas. On the Internet this sharing can include video and guided tutorials as well as traditional media such as lecture notes, homework assignments, textbooks, and exams. All of these materials were more difficult and more expensive to share before high-bandwidth Internet and modern computer systems became widespread. A group of educators has tried to define the OER movement in the [2007 CapeTown Open Education Declaration](#). Here is a short excerpt which gives the gist:

Unlocking the promise of open educational resources

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.

During the discussion, I asked participants if they had used any OER materials. Many of them had not. But I was excited to learn that one of the participants studied [Linear Algebra with video lectures by Gilbert Strang](#). Jeannie and I put more time into that excellent course (even doing all of the homework, quizzes, and two and a half final exams) than any other OER course we’ve worked through.

As a self-learner, one of the most important elements of OER courses to me is that I can choose how to use the materials (unlike in school where one is more or less told what to do). For example, there are some courses where I just want an overview or a feeling for the subject, but I may not need to master the material. Like when we studied [Introductory Biology at MIT’s OCW](#), we watched the videos and only briefly looked at the lecture notes. We skipped the homework and the tests. We quickly ignored the parts that were not, at that moment, of interest. I think this is a big improvement over school where I frequently suffered from wanting to go into more depth than the

course in some parts and less depth in others. Using OER I can get the education I want, when I want it!

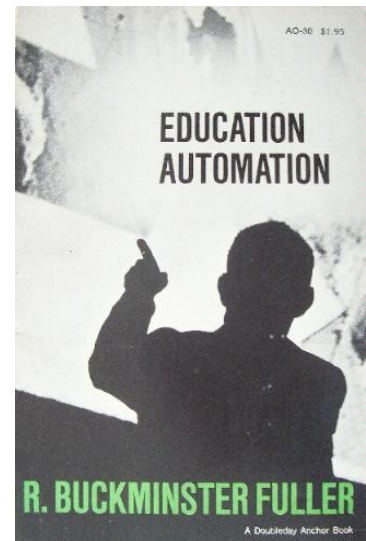
It should be noted that the OER movement has been partly inspired (according to [this good review article on open educational resources](#) in [Communications of the ACM](#)) by the FOSS (Free and Open Source Software) movement. I find this fascinating since I have long been involved in the FOSS / Linux world (I've written about that extensively in [the managing FOSS blog](#)). Fuller's global vision has foreseen elements of both movements.

To find out more about OER, the wikipedia entry

http://en.wikipedia.org/wiki/Open_educational_resources can get you started.

Buckminster Fuller on Education: Prescient Harbinger of the OER Movement

To prepare for the Ben Franklin Thinking Society discussion, I re-read *Education Automation* twice. That led to these five quotes on Bucky's thinking on education including how he foresaw elements of the OER Movement. The quotes and my commentary expand the discussion to address some broader issues in education as well. The quotes are all from *Education Automation* which was published way back in 1962.



- **Statement of the problem of education in its broadest context:**

We know our world population is increasing incomprehensibly swiftly. There are enormous numbers to be educated. ...

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?

... Unless the new life is highly appreciative of those who have gone before, it won't be able to take advantage of its heritage.

Education is, in part, boiling down and then presenting Humanity's cultural heritage for the benefit of the learner. Of course, there is the issue of continuing education for older life too, but the perspective of the expected addition of 3 billion more people over the next 40 years puts the scale of our educational problems into the proper perspective.

- **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." Given the chance to get accurate, logical, and lucid information at the time they want and need to get it, they will go after it in a most effective manner. 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 We are going to select, instead, the people who are authorities on various subjects 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. ...

“What you say is very good,” his associates may comment, “but we have heard you say it a little better at other times.” The professor then dubs in a better statement. Thus begins complete reworking of the tape, cleaned up and cleaned up some more, as in the moving picture cutting, and new illustrative “footage” will be added on. The whole of a university department will work on improving the message and conception of a picture for many months, sometimes for years. ...

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.

OK, so we no longer talk about “moving pictures” (but note the connection between Bucky and Gilbert Seldes as documented in an [interview between Allegra Fuller Snyder and Victoria Vesna published in Leonardo](#)). MIT OCW usually doesn’t dub in “better statements” (although I really appreciated how Walter Lewin did dub in some corrections to his excellent course on [Physics I: Classical Mechanics](#)). However, Fuller’s prognostication of subject matter experts preparing video documentaries has finally come to fruition with the advent of the OER movement!

- **Education as the major world industry**

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. ...

Our education processes are in fact the upcoming major world industry. ... The cost of education will be funded regeneratively right out of earnings of the technology, the industrial equation, because we can only afford to reinvest continually in humanity’s ability to go back and turn out a better job. As a result of the new educational processes our consuming costs will be progressively lower as we also gain ever higher performance per units of invested resources, which means that our wealth actually will be increasing at all times rather than “exhausted by spending.” It is the capability wealth that really counts. ...

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

First, I love the idea of education as part of the research and development (R&D) process. Wouldn't school be so much more engaging if you didn't have to graduate before you could start applying your knowledge to build and discover new things? If we could build new things each day as an integral part of the combined education / R&D process? Secondly, note how Bucky had already anticipated the importance of global information networks (*Education Automation* was transcribed from a lecture given on 22 April 1961 but the first publication on computer networks was in August 1962!). Now nearly 50 years later, Fuller's vision is spontaneously developing using the Internet instead of two-way TV.

- **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.

Why do we assume that knowledge is fixed and codifiable in textbooks? It isn't. We often suffer what Tom Miller once called the a "*hardening of the categories*" because we don't embrace the unlearning part that is an inherent part of the learning process. If unchecked, over time, our conditioned reflexes will become so out of tune with reality that our ability to solve problems effectively will vanish. Thus the *unlearning* process is vital to human affairs, but too few acknowledge it or work to help people with their unlearning process so they can better adapt to our rapidly changing world.

- **The future of education is *Individual Education***

I think ... that primarily the individual is going to study at home. That is in elementary, high school, and college years. Not until graduate work will he take residence on campus. 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.

This idea of individual education may be controversial. But when you really think about it, every student must formulate conceptual models (that is, learn), test their learning, unlearn whatever parts are a bit off-base, forget and re-learn continuously (while constantly bringing in new information to integrate with the old). That is, the student must work through the whole trial and error process around which learning depends. Even if a teacher or other educational resource can help short-circuit some of the process, fundamentally learning depends on individual initiative!

Overall, I love the way Bucky scoped out and defined the problem. Like most prognostications, it didn't turn out quite the way he predicted. But reality has proven to be true to the spirit of his vision.

Solving the Education Problem

Currently, education is a hot topic in the USA. In addition to the discussion about school reform, we also need to address the bigger, global education problem. According to UNICEF, some 100 million children do not even attend primary school. Clearly we need to educate them and provide on-going re-education programs to ensure everyone has access to the knowledge they need. To that end, slowly but surely the Internet is sprouting tools to facilitate large scale global education and to make it more and more incisive and efficient. The dawning of Internet-powered “education automation” via open educational resources (OER) is becoming increasingly apparent.

The fascinating work of [Sugata Mitra](#) shows just how effectively kids can learn — even without teachers! There are many other creative solutions out there. More will need to be developed. The big picture is clear: now that the OER movement is providing educational materials for everyone on the Internet, we can all tune-in and can keep abreast of the exciting ways in which knowledge is expanding.

What are your thoughts about education? What do you need to start participating as a student or a producer of OER material? Please post a comment with your thoughts.

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Author: [cjf](#)



- Full Name: **CJ Fearnley**
- Web: <http://www.CJFearnley.com>

25 Responses to “Buckminster Fuller and the Open Educational Resources Movement”

1. [Joshua Pang](#) on 26 October 2010 at 6:17 pm

Ok. I'll try and stick to the questions:

What are your thoughts about education?

Compulsory Education will not work it causes problems rather than solves it and even when one finds an Institute one enjoys often the GRUNCH-y structure results in failure. I am particularly bitter about my experience at the Ayurvedic Institute (www.ayurveda.com) which is halfway doing ok by recording Dr. Lad — anyway maybe read their education strategy. I failed, but it is interesting. Another interesting one is <http://www.americansanskrit.com>

Love Sanskrit.

Two more:

<http://www.anandashram.org> (or something to that effect)

<http://www.mywhatever.com/sanskrit>

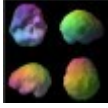
ok – those are my thoughts in a complete utterance

What do you need to start participating as a student or a producer of OER material?

Well I must say first in all radiation and entropy that money is such a huge factor. I am “tenured” only by my Father’s Psychiatrist salary (or something to that effect).

I would love to sort of just live on his money and learn to my own interests and stay at home and fun fun fun. But, I am not allowed — the deal is: Go to school

and get “corporate backing” from him or lose support and stake out on my own. I am not even allowed to room with anyone I want, my friend John is not allowed to be my roommate because my Parents think he caused me to dabble in Psychedelic mushrooms and whatnot...



Anyway, that is the big issue. You know what I mean? I’m thinking in terms of Critical Path and GRUNCH of Giants. The serious stuff between the Dark Ages and I suppose the Light Age. Yuga business perhaps, 2012 hopes. Let me clarify and say “that is the big issue” in my experience, for me.

Otherwise, I am Internet-ready and 21 years old. Though, just as a side comment I find the open universities not teaching what I want from standard academic menu. I’m really interested in three general field and their subsystems

Sanskrit-(Brain)-Synergetics

ok

Well those were the two questions, let me ADD for a bit and come back and see if this is good. Oh, that reminds me.

<http://www.amenclinics.com> has been good, but I had to buy their videos Making A Good Brain Great and The Brain and Behavior. Also RAW Robert Anton Wilson has Tale of the Tribe from Maybe Logic Academy which is good. All of this is encoded on my Facebook and Radiant Photons and whatnot. I think that stuff could turn into World Game // Democracy with the right ... uh, program? Anyway,

gonna go ADD, brb.

Oh Gosh! Of course you have gone through the RBF Stanford Archive? I haven't had the stomach for all his 22 videos about Business School, but I've done lots. I think the Bali one stands out. We missed you at Architecting the Future in Cali.

I dunno, I guess that's it. If you haven't check out Alfred North Whitehead's the Aims of Education <http://www.anthonyflood.com/whiteheadeducation.htm>
This isn't the whole book but it is a ... something.

Thanks for the Allegra interview, I'll read that when I have the eyes for it.

To ever less brain-comprehension lags!
-Josh

[Reply](#)

2. [cjf](#) on 26 October 2010 at 11:57 pm

Josh, thanks for the Sanskrit resources you provided. I spent a few minutes on them and Wikipedia's Sanskrit entry. Fascinating. It seems one can learn a lot of Sanskrit with free Internet resources. I saw a few with a Creative Commons license so they are more easily remixable. Language and words are critically important tools!

I started reading the Alfred North Whitehead article. Great find. Wow!

For courses on the Brain, I've been thinking about going through OpenYaleCourse's "Introduction to Psychology" <http://oyc.yale.edu/psychology/introduction-to-psychology/> and MIT's OCW has a bunch of courses on the Brain and Cognitive Science <http://ocw.mit.edu/courses/#brain-and-cognitive-sciences>



Have you looked at any of them?

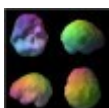
Jeannie and I just finished reading Jonah Lehrer's book "How We Decide". I liked it as a very superficial introduction to Brain Science. I liked that it accommodated intuition and instinct as well as logic and reasoning and specified the brain systems that seem to be responsible for each.

Have you read Bucky's two-part essay "Omnidirectional Halo" (it can be found in "No More Secondhand God"). That covers Synergetics from the Brain / Thinking side quite well. I think you might like it.

Thanks for your comments!

[Reply](#)

3. [Joshua Pang](#) on 27 October 2010 at 2:16 am



Ok well "spontaneous loving cooperation" I'll do what I can...

I just looked. Peeked, really. I want to say something here, but I'm having trouble.

Kind of because I don't want to express something in my thoughts is neutral but will come out as negative. Anyway, it "comes out now" as a problem in traditional templating. It is very original Greek Academy. I imagine very Latin Grammar. I have to meet these thoughts where they're at. I really like the Call-and-Response learning method found in some of my Sanskrit-learning experiences.

I am fairly convinced that SPECT Scanning is a revolution in Brain Science and that is the only system I comprehend.

I have read Omnidirectional Halo (multiple times). I like it, but its like I'm still unpacking the file.

If I have the memory, I'll check out "How We Decide" "Introduction to Psychology" "Brain and Cognitive Science" "Bucky"

<http://singularityu.org/videos/>
<http://st7peter.angelfire.com/>
<http://www.freebsd.nfo.sk/hinduism/>

who sends the mind to wander afar? (who sends the brain to wander afar?)

Only Integrity...

Keep sending me resources however, I feast on these links!

[Reply](#)

4. **cjf** on 28 October 2010 at 4:47 pm



Just saw this great resource: <http://undergraduatedegree.org/2010/top-40-sources-for-open-courseware-videos/>

[Reply](#)

5. **cjf** on 28 October 2010 at 4:52 pm



Another: <http://blog.curriki.org/2010/09/30/best-open-free-educational-resources-for-students/>

[Reply](#)

6. **Roger Tobie** on 28 October 2010 at 7:23 pm



Nicely done C.J. But the phrase "hardening of the categories" originated with me, not with Tom Miller. I think if you check with Tom he'll confirm that. Sorry, a little pride of authorship there. Not too often do I get to claim authorship of a "cute" phrase. However, now that it's in print, everybody will attribute it to Tom. After all, whatever is printed is TRUE, isn't it?

Roger

[Reply](#)

7. [cjf](#) on 28 October 2010 at 7:34 pm



Roger, I'm so sorry. It stuck when I heard Tom say it. Maybe I wasn't there when you introduced the expression? Thanks for setting the record straight.

[Reply](#)

8. [Roan Carratu](#) on 30 October 2010 at 11:36 am

Your take on the new paradigm of education is exactly what the Zeitgeist Movement is working on. I've passed your blog address on to the movement and you might get a lot of interest from some of the 400,000 current members globally.



Don't believe anything you have heard about the Zeitgeist Movement or the Venus Project. Check it out yourself at thezeitgeistmovement.com
We want the same thing that Bucky wanted... a sane peaceful world to leave to our children.

Peace and good health to you and yours,
Roan Carratu (worldmind@yahoo.com)

[Reply](#)

9. [Kirby Uerner](#) on 30 October 2010 at 12:04 pm

Wikieducator prides itself as a OER site. The community, which has a base in New Zealand among other places, is committed to open source and OER models.



I've contributed some curriculum writing that's free to teachers and covers a lot of the B. Fuller approach to spatial geometry, under the heading of Martian Math.

http://wikieducator.org/Digital_Math

Kirby

[Reply](#)

10. [Bruno Lavos](#) on 30 October 2010 at 1:01 pm

Hey CJ...Hey Roan!

I received the mail from Roan and I came to check it for myself:



Hey CJ... would you want to develop your idea and "future project" inside the Zeitgeist Movement?

I work in education too... and I Love the Open Source Paradigm.

Please contact me so we can talk a little bit more...:

satoribox@hotmail.com

Love
Bruno

[Reply](#)

11. [cjf](#) on 30 October 2010 at 1:20 pm

I've seen a bunch of very interesting videos on Brain / Mind related issues at TED here are some of my favorites (now I'll have to re-watch each one so I can respond to any feedback):

http://www.ted.com/talks/lang/eng/temple_grandin_the_world_needs_all_kinds_of_minds.html

http://www.ted.com/talks/lang/eng/dan_gilbert_asks_why_are_we_happy.html

http://www.ted.com/talks/lang/eng/dan_gilbert_researches_happiness.html

http://www.ted.com/talks/lang/eng/barry_schwartz_on_the_paradox_of_choice.html

http://www.ted.com/talks/lang/eng/barry_schwartz_on_our_loss_of_wisdom.html

http://www.ted.com/talks/lang/eng/laura_trice_suggests_we_all_say_thank_you.html

http://www.ted.com/talks/lang/eng/dan_ariely_on_our_buggy_moral_code.html

http://www.ted.com/talks/lang/eng/devdutt_pattanaik.html

http://www.ted.com/talks/lang/eng/helen_fisher_studies_the_brain_in_love.html

http://www.ted.com/talks/lang/eng/jeremy_rifkin_on_the_empathic_civilization.html

http://www.ted.com/talks/lang/eng/carl_honore_praises_slowness.html

http://www.ted.com/talks/lang/eng/seth_godin_on_the_tribes_we_lead.html

http://www.ted.com/talks/steven_pinker_on_the_myth_of_violence.html

http://www.ted.com/talks/lang/eng/tony_robbins_asks_why_we_do_what_we_do.html

http://www.ted.com/talks/lang/eng/derek_sivers_how_to_start_a_movement.html

http://www.ted.com/talks/lang/eng/karen_armstrong_makes_her_ted_prize_wish_the_charter_for_compassion.html

I don't fully agree with Derek on this one, but there is a lot of truth in it:

http://www.ted.com/talks/lang/eng/derek_sivers_keep_your_goals_to_yourself.html

[Reply](#)

12. [cjf](#) on 30 October 2010 at 11:37 pm

Roan, Bruno, Thanks for letting me know about the Zeitgeist Movement. I'm going to have to do a lot more research before I can understand how the Zeitgeist Movement, the Venus Project and the work of Jacque Fresco integrate with my thinking and the non-profit where I devote the majority of my volunteer time, that is, the [Synergetics Collaborative](#).

I wholeheartedly endorse this excerpt from your [Orientation Guide \(PDF\)](#) which

says,

there is no reason why we cannot come together and use human ingenuity to accomplish incredible social achievements for the betterment of humanity. It is time we unleash our 'Weapons of Mass Creation' (WMCs) unto the world. It is time we take responsibility for each other and ourselves.

A few years ago I watched the beginning of "Zeitgeist The Movie" and felt that it was a bit "over the top" — I didn't like the approach. I see from the part of the Orientation Guide quoted above that I might have misjudged the movement based on my reaction to the video. I welcome a discussion to find points of common interest.

[Reply](#)

13. **Tom Miller** on 5 November 2010 at 8:46 am



Roger is absolutely right, I don't remember ever saying that phrase. But Roger you are wrong, if it is on TV it is true, not written some where.

[Reply](#)

14. **cjf** on 5 November 2010 at 11:03 am

Roger, Tom, since the attribution is both contested and unnecessary, I have struck it out.



I did a Google search on "hardening of the categories" and it is clear that the expression has been in use for a long time. [The CIA even has a long writeup on memory](#) that mentions "hardening of the categories" (its forward dates the content to 1978-86). In [a report of the Family Impact Center dated 1991](#), it is asserted that Elliott Richardson coined the term "*hardening of the categories*" in the early 1970s. So I did not need to cite my personal hearsay. The phrase now belongs to our cultural heritage.

[Reply](#)

15. **Doug** on 12 November 2010 at 9:27 pm



Thanks, CJ. There is much to chew on here and in your other posts.

[Reply](#)

16. **Paul Gowan** on 17 November 2010 at 1:41 pm



I have a lot of thoughts about education. I read Buckminster Fuller's book "Education Automation" in 1987 and sketched out a lot of ideas pertaining to educational software, the World Game, and computer networks. One thing I noticed many years later is that the anthology prepared for teachers that contains the text of "Education Automation" did not include the foreword by Charles D. Tenney. The foreword explained to whom Buckminster Fuller gave the speech and

why.

You might want to mention the use of voice actors such as Patrick Stewart in educational software and encyclopedias. One might also mention Hollywood attempts to insert education in science fiction series and NOVA's documentaries. My interest in Artificial Intelligence led me to the work of Dr. Roger Schank and I strongly advise anyone with an interest in education in general and the use of computers in education specifically, to start with Dr. Schank.

Dr. Roger Schank, Socratic Arts

<http://engines4ed.org/schank/index.cfm>

Engines for Education Hyperbook

<http://www.engines4ed.org/hyperbook/>

[Reply](#)

17. **cjf** on 19 November 2010 at 3:48 pm

Dr. Schank's [Top Ten Mistakes in Education](#) is spot on. Thanks for pointing out his work. I didn't find much on the engines4ed site about better educational resources. Did I miss them?



Sir Ken Robinson's two great TED Talks on education seem apropos to Dr. Schank's work:

http://www.ted.com/talks/lang/eng/ken_robinson_says_schools_kill_creativity.htm

[1](#)

http://www.ted.com/talks/lang/eng/sir_ken_robinson_bring_on_the_revolution.htm

[1](#)

[Reply](#)

18. **Dick Fischbeck** on 19 November 2010 at 10:12 pm



Jeeze. Lots of action here! Good. We need action. --

[Reply](#)

19. **Paul Gowan** on 20 November 2010 at 4:02 pm



The Top Ten Mistakes in Education is certainly one good place to begin. Where is my lifetime Research Fellowship? My student loan blew up long ago. Did the University planning committee take ANY of Dr. Fuller's advice? We can use the internet and things like TED, YouTube and SLOODLE (SecondLife + Moodle) as our documentary call-up system and virtual educational forum but it's only a half loaf at present. What would you say was the quality of the Open Courseware you viewed? Did the visual parts add much and how often were projected screens out of site? Does the transcript read, "STUDENT: inaudible." Were there any interactive parts? How much do you remember? If education interests you, I urge you to see the video "Why Is Most E-learning A Disaster?" at <http://engines4ed.org/schank/rsc5.cfm> and the youtube video by Dr. Schank, The History of Lecture as a form of thinking. (<http://www.youtube.com/watch?v=hYryStN4tis>).

Also, regarding Mistake #1, and better educational resources see “Learning by Doing” in the Engines for Education Hyperbook and the notes on the goal-based scenario educational software that was created. HERE is one place for the multi-disciplinary teams Dr. Fuller talked about and I’m sure they will be available for consultation on major motion pictures and documentaries.

Would you say that the open educational material available is the core teachings that MIT charges big bucks for? How long do you think it might be before proprietary intellectual property laws are strictly enforced and the commons is enclosed?

What can you actually legally do with what you learned from the open courseware?

Dr. Schank’s page on Education can be found here.

(<http://www.rogerschank.com/education.html>)

You might find an interesting idea or two regarding “The Schooling of the World” in “The Salvaging of Civilization” (1926) by H.G. Wells Part VI, pp. 141-174. How about this:

“I want to see a great central organization, employing teachers of genius, working in consultation and co-operation and producing lesson notes, diagrams, films, phonograph records, cheaply, abundantly, on a big scale for a nation, or a group of nations, or, if you like, for all the world, just as America produces watches and alarm clocks and cheap automobiles for all the world. And I want to see the schools of the world being run, so far as the intellectual training goes, not by local committees but by that central organization.”

http://www.archive.org/stream/salvagingofcivil007684mbp/salvagingofcivil007684mbp_djvu.txt

Others I might mention if I had space: Dr. David Hestenes, Robert Scott Root-Bernstein, Edward de Bono, Joseph Agassi.

[Reply](#)

20. **Paul Gowan** on 20 November 2010 at 4:14 pm

The Ken Robinson videos are great!

Re: Creativity and for some comments on education and Universities see Rhiz Khan’s one on one interview with Dr. Edward deBono.



http://www.youtube.com/watch?v=AkgVzMu_W44&playnext=1&list=PLCFB7E96CD1DD9675&index=32

[Reply](#)

21. **cjf** on 1 December 2010 at 2:24 pm

Paul, I watched Dr. Schank's videos and I agree with his points that moving the traditional classroom to e-Learning is probably not the best way to take advantage of the new media and that lecture has some deficiencies. However, to answer your question, the quality of the Open Courseware that I've viewed has been outstanding. Of course, there is some bad stuff to weed through. One example of a fantastic course was [MIT's OCW course on Linear Algebra](#). Yes, learning by doing is essential, and I did practice by thinking through the material, doing the homework and taking the quizzes and final (2.5 finals, in fact). The OER material provided by MIT was just the starting point, as the student, I needed to learn by doing inspired by the materials. It can work!

I view open educational resources (OER) as components for either a self-directed or a "mashup-style" derivative work (most OER materials, including MIT's OCW, are licensed under a [creative commons](#) "share-alike" license). As a self-learner, I can take video lectures to get the "lay of the land", then decide on a study plan (using books, lecture notes, videos, etc). I will be learning by doing because I am the teacher orchestrating my own learning path ... researching the learning options for a subject of my choosing. I can use OER materials as I see fit, it gives me options that previously would have been time-consuming or impossible to find. This is how I use OER materials and it works for me.



OER is also valuable as raw materials for schools (both traditional and novel), teachers, and even research teams who may need to train their cross-disciplinary members in different subjects. It is very difficult and time consuming to develop good educational materials to help explain our cultural heritage to new learners. Using OER materials to overcome that initial hurdle is significant. Of course, the materials will need to be adapted by each user (self-learner, teacher, research project coordinator, etc.) for their own situation. One missing element from OER at present are integrated programs that guide others through subjects ([Open Study](#) and [University of the People](#) are two first generation experiments). The OER movement can be roughly assumed to have begun when MIT started putting out OCW in about 2002: it is a very young initiative. I would guesstimate that it is about where the [FOSS \(Free and Open Source Software\)](#) movement was in about 1993: having tons of great materials, but no [Ubuntu](#) has yet come along to integrate OER into a cohesive system that even a grandmother can use. Right now, OER is hit-or-miss and not always appropriate to all learners. It will take time to mature. But I recommend valuing OER for how its "half-filled glass" provides so many more resources to self-learners, teachers, and researchers than were ever previously available. OER is a new part of our cultural heritage and it will grow and improve over time.

Finally, I must report that I like the lecture format. Perhaps its biggest strength is that it can introduce a new subject effectively. Humans have used story-telling since long before the monks in the middle ages. It is deep in our cultural heritage. Auditory learning is not best for everyone: I believe that I myself have auditory processing deficiencies (maybe we all do?). Still, I would argue that the auditory processing skills that lecture requires and develops are important skills. What I love about video lectures is that I can backup and review the parts that I missed the first time through. [Note: I hate flash as a means of delivering video because it is too difficult to move the video back, however, I always try to download the videos and use [Mplayer](#) which is programmed into my remote control so I can

comfortably backup the video.]

I do agree with Dr. Schank, that learning by doing is essential and lecture cannot replace that. But each technique should be viewed for what it is good for, not criticized just because it has some deficiencies. Everything and everyone has both strengths and weaknesses. We should acknowledge the deficiencies but treasure and build upon the strengths!

[Reply](#)

22. **Paul Gowan** on 7 January 2011 at 1:50 pm

Khan Academy (<http://www.khanacademy.org/>)

The above is an interesting educational website I stumbled upon yesterday through YouTube.

I also noticed a few weeks ago that a three year old piano prodigy was taught to play the piano in a manner similar to the little girl Bucky mentions in “Education Automation” who was taught to type with coloured nail polish on the keys and her fingernails. For Piano, it’s called “The Rainbow Piano Technique”

I have some inert training material of my own online that I would never boast about and over the course of the last 15 years or so, I’ve seen a lot of my educational bookmarks/links vanish from the web or like “Probability: The Logic of Science” by Professor Edwin Jaynes, become unavailable online because a publisher decided to publish the material posthumously as a book and asked that the material be removed from the web. Now I’m getting a lot of “This video is no longer available in your country due to copyright laws” and educational material that was once available online for free is being packaged for sale if one has a credit card or Paypal account. One company is charging US \$9.95 for papers in computer science. YouTube users are actually really bad for violating intellectual property laws in their enthusiasm to share videos and music. All of Bucky’s “Everything I Know” 42 hours of video is on YouTube in 159 segments and I really hope the Buckminster Fuller Institute turns a blind eye to it or officially endorses it while offering the high quality version for pay-per-view through Netflix or something similar.



When you think about it, public libraries and University libraries could also be regarded as major violations of intellectual property laws.

I have often noted how professional teachers constantly say there is no money but I’ve seen other people start on shoestring budgets and actually get something done. Khan Academy is another example of doing what one can with what one has. See “History Today”, May 2010, Pg. 65, 5th paragraph.

“What has surprised me is that so few educational institutions have tried to create something similar to WW2History.com themselves. I asked a group of historians at the London School of Economics why this was the case and the number one answer was both obvious and dispiriting – lack of funding.”

I would really like to see OER succeed but sooner or later it’s going to run into intellectual property laws, corporate proprietary intellectual property and censorship for safety/antiterrorism reasons. There are people that have tried to obtain patents on basic addition algorithms etc. and the nation can’t have teenagers reading John Taylor’s “The Curve of the Binding Energy” and mixing up batches of nitrogen triiodide such as in the movie “The Manhattan Project” or draining tritium from rifle night scopes for backyard nuclear experiments.

P.S. Did the MIT Linear Algebra course make any mention of the Geometric

Calculus of Dr. David Hestenes? (<http://geocalc.clas.asu.edu/>)

[Reply](#)

23.[cjf](#) on 7 January 2011 at 3:44 pm

Paul,

Khan Academy is great! It is inspiring how he has managed to monetize his gift for teaching math and science. As you point out, money thoughts have killed many a great idea. Hacking Ken Iverson's words, I'd say: "If it's worth doing, it's worth doing for no money even if that means poverty (and it often does)." But the issue is very multi-faceted; I struggle and continue to experiment with the issue a lot.

Currently, there is tension between sharing and controlling information. Sharing increases the acceleration of learning and knowledge development which typically results in a net positive for society. I think we are getting closer to a time when the risks of not sharing will be felt more acutely as people realize that one's work is more likely to be eclipsed by alternatives that are shared more widely and thereby have a chance to grow and evolve faster. The biological analogy between the slowness of evolution with asexual reproduction vs. the rapid speed of meiosis (sex) applies: the stodgy "I won't share my genes, I just want controlled copies" will "lose" to more flexible evolutionary technology. I think the analogy is good because it suggests that the current system will not be eliminated: there are still creatures like the amoeba and yeast that continue to use asexual reproduction. But the "cutting edge" of biological evolution relies on meiosis and likewise the cutting edge of society and education will gravitate to what is shared with less mind share going to what is "controlled".



Since [R. W. Gray](#) first told me about geometric algebra (or calculus), I've been fascinated but unable to really "get it". Although [the MIT Linear Algebra course](#) did not directly address the subject, its approach has given me new insights into geometric algebra. In particular, Gilbert Strang's care in emphasizing the dual nature of the column and row interpretations of matrices got me over several hurdles in my quest to understand multilinear algebra. But it is still on my TODO list. I started reading [John Browne's fascinating, elementary book on Grassman Algebra](#) (which is essentially what Clifford and Hestenes built upon). Maybe your "nudge" will push that back onto my reading list 😊

[Reply](#)

24.[cjf](#) on 14 November 2012 at 8:24 am

Based on this essay, I delivered the presentation [Education Automation Now and in the Future](#) at the [ReVIEWING Black Mountain College 4: Looking Forward at Buckminster Fuller's Legacy](#) conference.



[Reply](#)

25.[CJ Fearnley](#) on 7 February 2014 at 12:07 pm

Evidently, in 1934 Northwestern University president Walter Dill Scott got a glimpse of the OER movement. References:



<http://paleofuture.gizmodo.com/depression-era-teachers-predicted-online-schools-would-1506529840> and <http://www.openculture.com/2014/01/the-president-of-northwestern-university-predicts-online-learning-in-1934.html>

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