

MOOC-ING AROUND

WHAT IS A MOOC?

WHO MAKES MOOCS?

WHO TAKES MOOCS?

WHY TAKE A MOOC?

WHAT DOES IT TAKE TO MAKE A MOOC?

WHAT IS THE FUTURE OF MOOCS?

WHAT IS A MOOC?

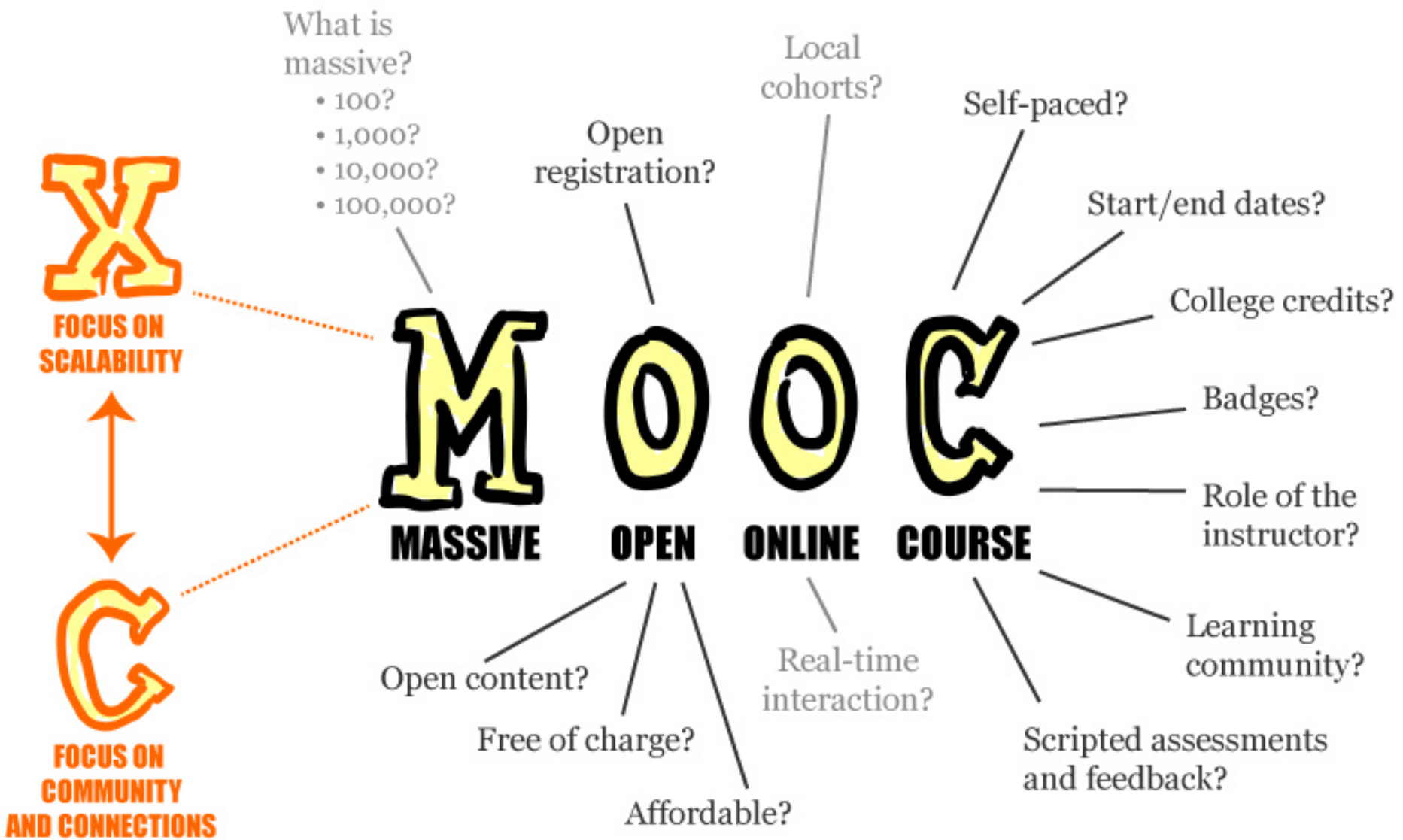
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Institution	Producer
Stanford	Coursera
Edinburgh	Coursera
Harvard	edX
Harvard	edX
MIT 8.02x	MITx
RiceX	edX
MIT 2.03x	edX
MIT 8.01x	edX
École Normale Supérieure	Coursera
МИПТ (Физтех)	МИПТ
MIT	MITx
Columbia	edX
Columbia	edX
Columbia	edX
U. Washington	Coursera
MIT 8.421	edX
MITx	edX
U. Tx. Austin	?
George Washington U.	edX
Wesleyan	Coursera
École Polytechnique	Coursera
Caltech	Coursera
MIT 8.422 (2013)	MIT OCW

WHAT IS A MOOC?

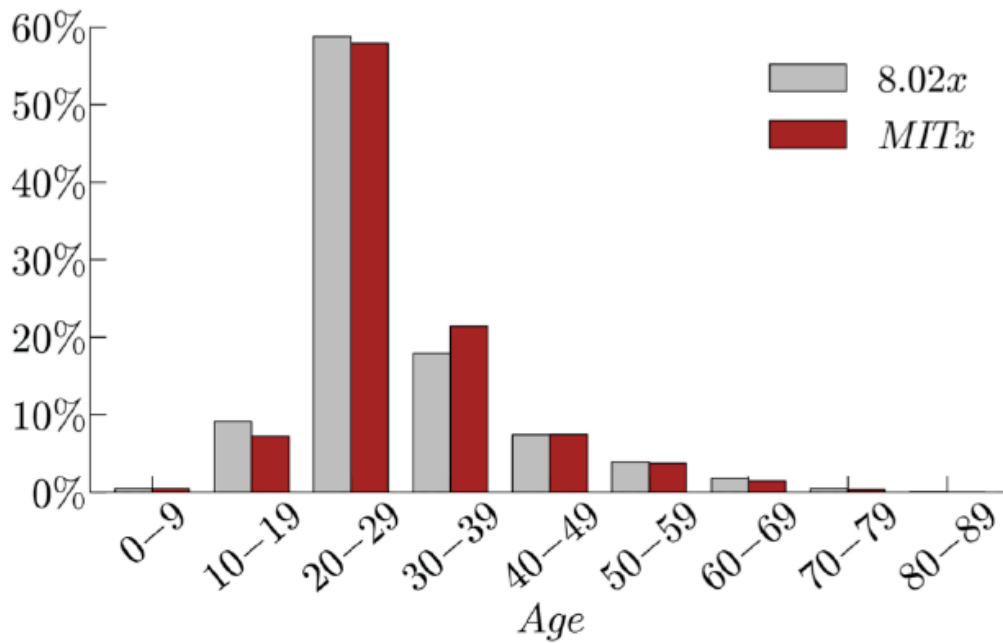
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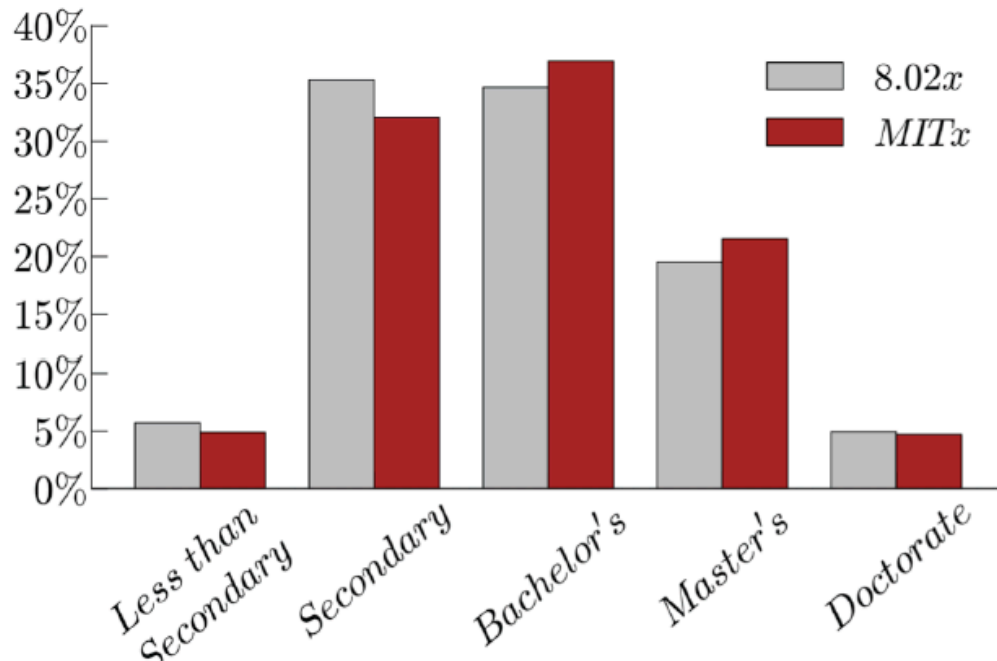
WHY TAKE A MOOC?

WHAT DOES IT TAKE TO MAKE A MOOC?

WHAT IS THE FUTURE OF MOOCS?



Participants	
Registered	41,307
Viewed	27,912
Explored	3,242
Certified	1,716



The fraction of experienced learners is out of proportion to their share of the population

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Date	Subject	Institution	Producer
2012	Cryptography	Stanford	Coursera
2012	Introduction to Philosophy	Edinburgh	Coursera
2013	Ancient Greek Hero	Harvard	edX
2013	Science of Cooking	Harvard	edX
2013	Electricity & Magnetism	MIT 8.02x	MITx
2013	Electricity & Magnetism	RiceX	edX
2013	Mechanics	MIT 2.03x	edX
2013	Mechanics	MIT 8.01x	edX
2013	Galois Theory	École Normale Supérieure	Coursera
2014	EM электричество	МИПТ (Физтех)	МИПТ
2014	Effective Field Theory	MIT	MITx
2014	1850-61 Civil War & Reconstruction	Columbia	edX
2014	1861-65 Civil War & Reconstruction	Columbia	edX
2014	1865-90 Civil War & Reconstruction	Columbia	edX
2014	High Performance Computing	U. Washington	Coursera
2015	Atomic & Optical Physics I, part 1:	MIT 8.421	edX
2015	Mastering Quantum Mechanics	MITx	edX
2015	Linear Algebra (LAFF)	U. Tx. Austin	?
2015	Numerical Analysis	George Washington U.	edX
2016	Complex Analysis	Wesleyan	Coursera
2018	Quantum Optics 1: Single Photons	École Polytechnique	Coursera
2019	The Science of the Solar System	Caltech	Coursera
2020	Atomic & Optical Physics II	MIT 8.422 (2013)	MIT OCW

Alasdair Richmond

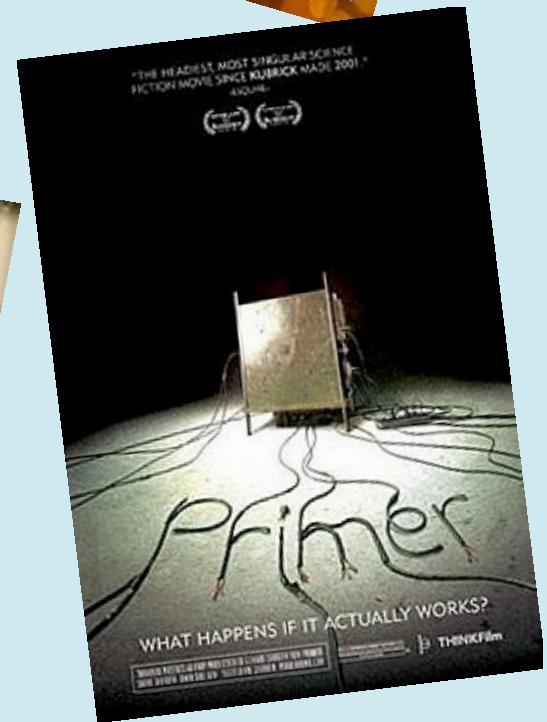
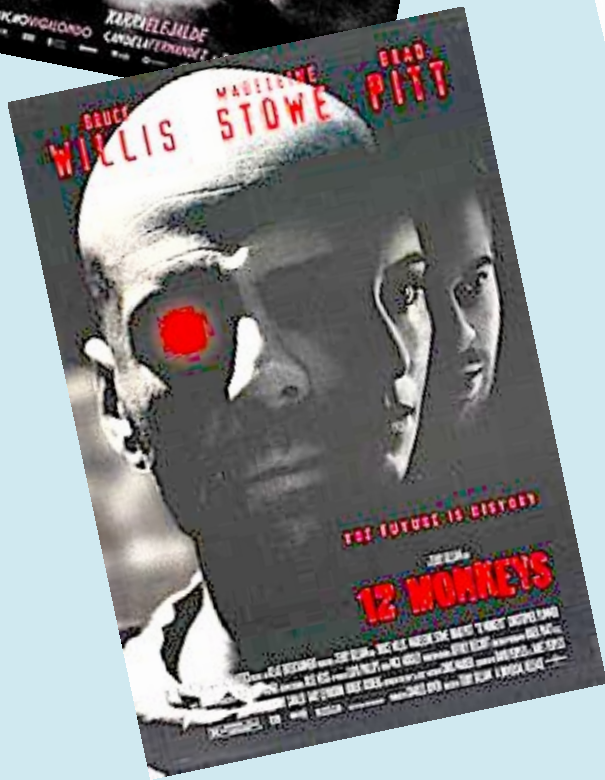
Likewise, here are a few time-travel films that seemed interesting to me too:

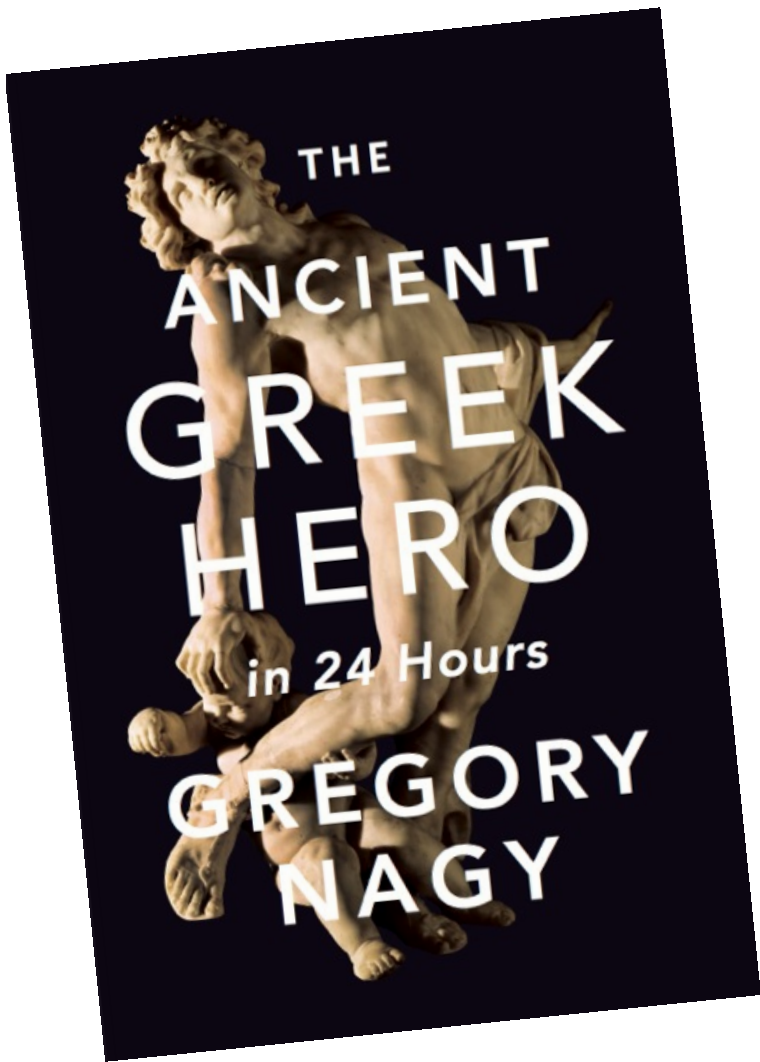
- *La Jetée*, (1962), written and directed by Chris Marker. Beautiful, haunting short film told almost (but not quite) entirely in stills.
- *12 Monkeys*, (1995), written by David Peoples and Janet Peoples, directed by Terry Gilliam, (inspired by Marker's *La Jetée*). Along with Audrey Niffenegger's *The Time Traveler's Wife*, perhaps the best fictional exemplification of David Lewis's classic analysis yet devised.
- *Primer*, (2004), written, directed and produced by Shane Carruth. Not at all Lewisian but thoroughly intriguing – watch it at least twice, ideally the second time with director's commentary, some string and a notepad handy.
- *Time Crimes (Los Cronocrimenes)*, (2007), written and directed by Nacho Vigalondo. Also thoroughly Lewisian, albeit to some very strange, *film noir-ish*, ends. Another “watch at least twice” job.

I am always in the market for more recommendations however.

(I confess I haven't managed to see *Looper* (2012) yet but I hear it's very good.)

- *Looper* (2012)
- *The Time Traveler's Wife* (2009)





Was Odysseus (Ulysses) a psychopath?

The Hare Psychopathy Checklist-Revised

In this test, participants read twenty statements that describe certain traits and rate them:

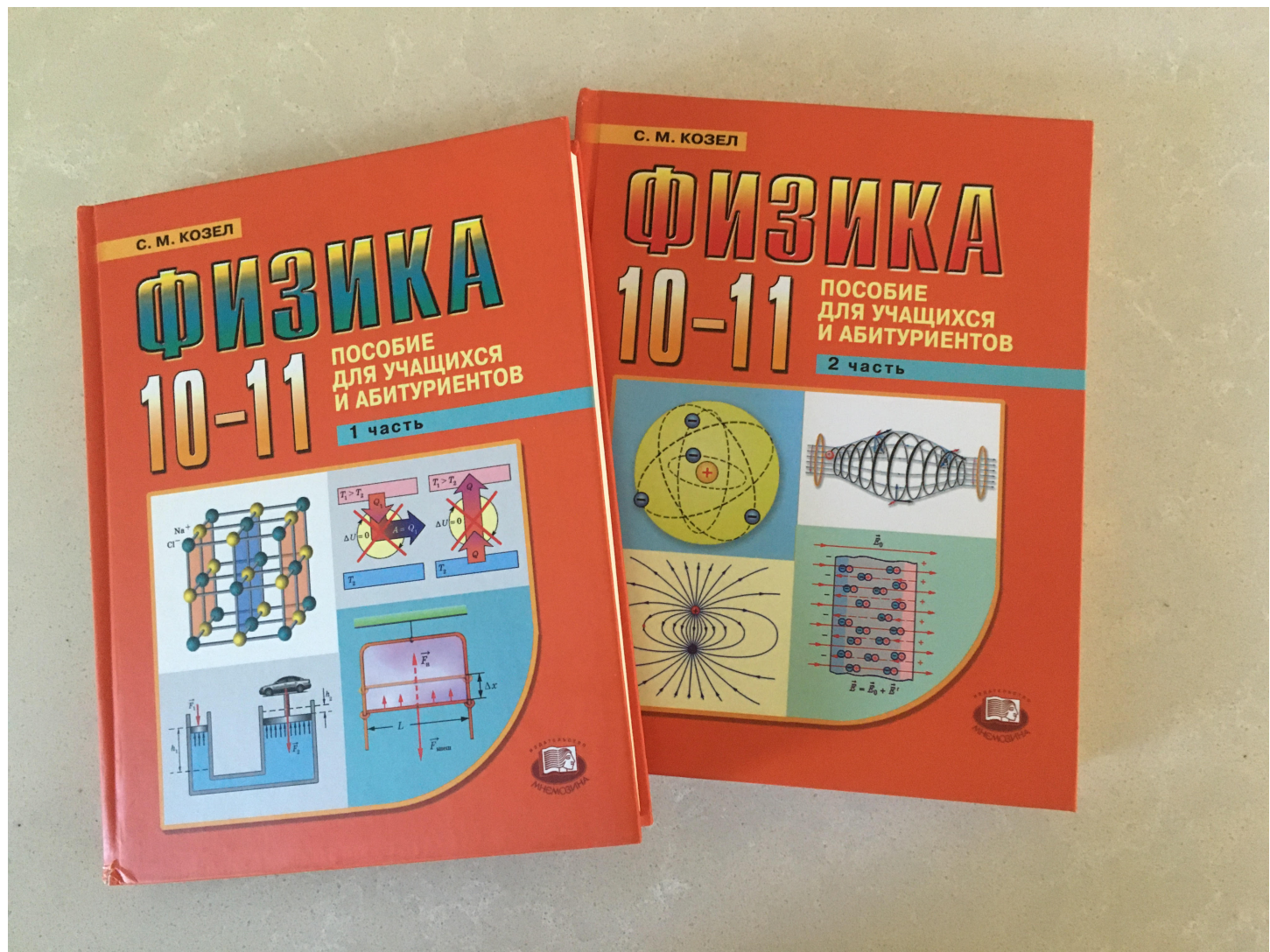
- 0 = does not apply,
- 1 = applies somewhat
- 2 = definitely applies.

The highest score anyone can achieve is 40. In the US, if you rate over 30 , you are considered to be psychopathic. In the UK, you only need to score over 25

Here are the 20 traits on the Hare Psychopathy Checklist

1. Do you sense you are someone extremely important?
2. Would you say you need constant stimulation?
3. Do you find pleasure in manipulating people?
4. Would you lie in order to get your own way?
5. Do you never say sorry?
6. Are you known to be charming and persuasive?
7. Would you agree you show little emotion?
8. Are you incapable of feeling empathy for others?
9. Are you in and out of relationships all the time?
10. Do you have a promiscuous sex life?
11. Are you impulsive and live for the moment?
12. Are you known for behaving irresponsibly?
13. Do you fail to accept responsibility for your actions?
14. Is it right to get as much as you can from other people?
15. Is it hard to control your behavior?
16. Did you display early behavior problems?
17. Do you lack long-term goals?
18. Do you have a history of juvenile delinquency?
19. Have you ever had your parole or bail revoked?
20. Are you known for committing many different criminal acts?

Practice a language



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WHAT IS THE FUTURE OF MOOCS?

To write a problem

Six edX templates – there are > 20

LaTeX – use for text and for some problems

TeXworks – to edit LaTeX

LaTeX2edX.py to convert LaTeX to xml

Python – to read LaTeX2edX code to find undocumented tags and attributes

Python -- to write scripts to add flexibility and responsiveness,
e.g handle string input, offer hints, deal with free responses

TextWrangler – to edit xml, Python

xml – to modify and correct LaTeX2edX outputs; to make best use of edX templates

To make a graph or figure

Sketchup

Screen Capture

Grapher

Inkscape

Matlab

Excel

PowerPoint

To fit to edX file structure

know the **course file structure** required by edX – there are >10 specific files to which
the components of the course must be correctly allocated; I use ~6

Finder **bash cmds**: for navigation & for file management

To test a problem

edX platform – tabs, organization

Vmbox and vagrant – to make a virtual machine to run the edX platform on my computer

To enter a problem

Git, github – version control: cmd line commands local; push & pull remote

Counter-Intuitive Research Evidence for Course Design

- Allowing students to navigate through a course in any way they wish harms both learning and transfer (*Elan & Clark, 2006*)
- For novice learners, most immersive simulations and serious games are significantly **less effective** and **more expensive** than other ways to teach because of "discovery learning" (*Clark, 2007*)
- Faculty who are top experts are only able to describe **30%** of the analytical and decision strategies they use to perform complex tasks (*Clark, 2013*)
- **50%** of students are wrong when asked what and how much they learned from instruction (*Clark & Estes, 2008*)

Physics Lessons / Tutorials

AP Physics 1: Introduction
AP Physics 1: Kinematics
AP Physics C: Kinematics
AP 1: Forces
AP 1: Work and Energy
AP 1: Simple Harmonic Motion
AP 1: Momentum
AP 1: Torque
AP Physics C: Rotation
AP C: SHM
AP 1: Static Equilibrium
AP 1: Waves and Sound
AP Physics 2: Fluid Mechanics
AP Physics 2: Thermal Physics
AP 1 & 2: Static Electricity
AP C: Electric F, E & Gauss's
Law
AP 1 & 2: Circuits
AP 2: Magnetism
AP 2: Induction
AP 2: Optics
AP 2: Light Wave
AP 2: Modern Physics
AP 1 & 2: Review Videos
Old AP Physics B Exam
Problems
Old AP Physics C Exam
Problems



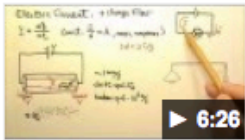
Yau-Jong Twu

Eleanor Roosevelt High School

Green Belt, Maryland

<https://sites.google.com/site/twuphysicslessons/home>

AP Physics B Lessons with Ms. Twu: Circuits 1: Electric Curr...



www.youtube.com/watch?v=... YouTube
Feb 9, 2013 - Uploaded by onlearningcurve
Please visit my website <http://www.twuphysics.org> for supplemental material and complete lists of Ms. Twu's ...

<http://twuphysics.tumblr.com>

AP Physics B Lessons with Ms. Twu: Fluid Mechanics 10: H...



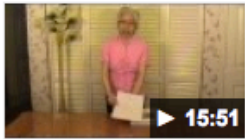
www.youtube.com/watch?v=BhgmJPli_fk YouTube
Nov 4, 2012 - Uploaded by onlearningcurve
Please visit my website <http://www.twuphysics.com> for supplemental material and complete lists of Ms. Twu's ...

AP Physics B Lessons with Ms. Twu: Fluid Mechanics 1: De...



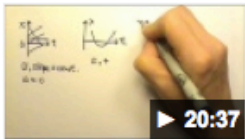
www.youtube.com/watch?v=zb6k... YouTube
Oct 31, 2012 - Uploaded by onlearningcurve
Please visit my website <http://www.twuphysics.com> for supplemental material and complete lists of Ms. Twu's ...

AP Physics B Lessons with Ms. Twu: Kinematics 12: Falling...



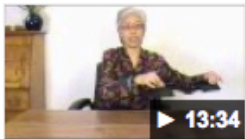
www.youtube.com/watch?v=t51kqmUTioo YouTube
Jun 11, 2012 - Uploaded by onlearningcurve
Please visit my website <http://www.twuphysics.com> for supplemental material and complete lists of Ms. Twu's ...

AP Physics B Lessons with Ms. Twu: Review: Kinematics 1 ...



www.youtube.com/watch?v=5-1eSY9jxas YouTube
Apr 12, 2013 - Uploaded by onlearningcurve
Please visit my website <http://www.twuphysics.org> for supplemental material and complete lists of Ms. Twu's ...

AP Physics B Lessons with Ms. Twu: Momentum 2: Moment...



www.youtube.com/watch?v=... YouTube
Sep 22, 2012 - Uploaded by onlearningcurve
Please visit my website <http://www.twuphysics.com> for supplemental material and complete lists of Ms. Twu's ...

The camcorder I use is a 5-year old non-HD model: Sony Handycam DCR-SX60. I use a lot of lights - sometimes I think the lights hurt my eyes. I guess I should probably have gotten a better camcorder because the video quality only looks fine on a very small screen. I do everything by myself. And I use Microsoft's free version of the Windows Live Movie Maker for editing. It's very time consuming though - especially when it involves demonstrations.

Yau-Jong Twu

Eleanor Roosevelt HS
Greenbelt, MD

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THE CLASSIC BESTSELLER

"Highly brilliant. Clayton Christensen provides an insightful analysis of changing technology and its importance to a company's future success."

—Michael R. Bloomberg, Founder, Bloomberg Financial Markets, and Mayor of New York City

THE

Innovator's Dilemma

The Revolutionary
Book That Will Change the
Way You Do Business



CLAYTON M. CHRISTENSEN

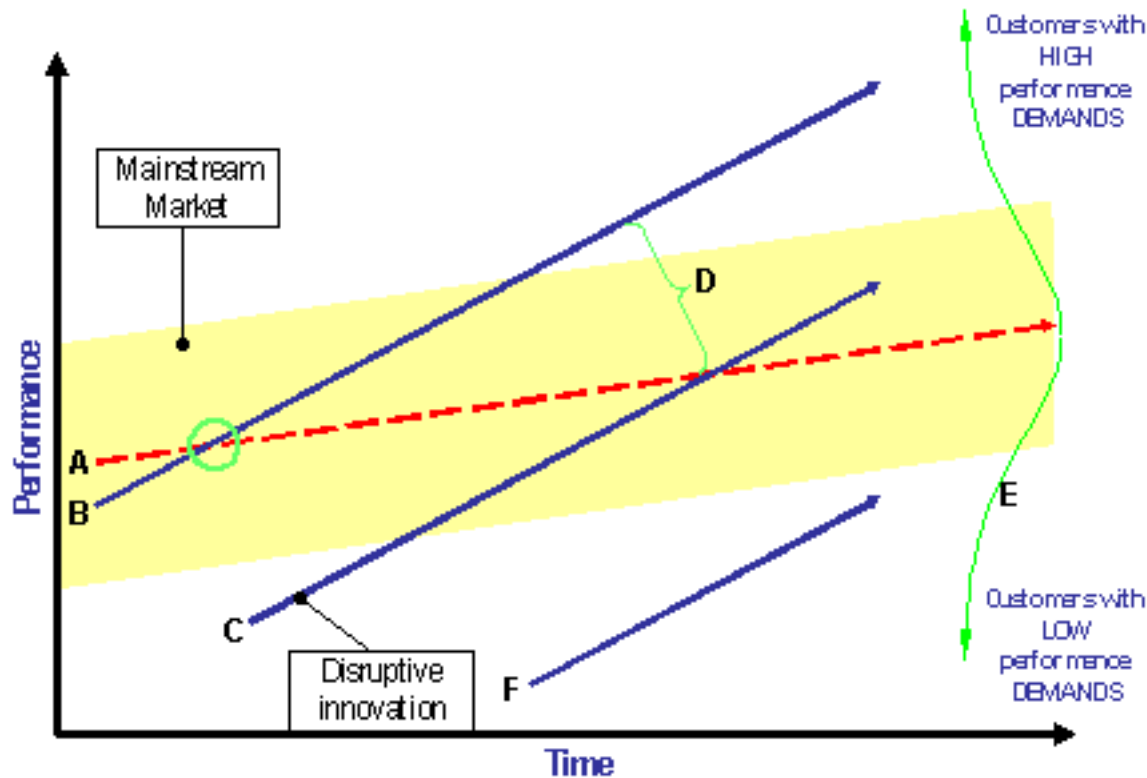


DISRUPTIVE INNOVATION

- ease of use
- affordability
- open new markets even if quality is low
- undercut higher quality products
- especially products evolving beyond their market's needs

Examples:

- rebar
- automobiles
- transistor radios
- disk drives
- camera/phones
- ride hailing



Disruptive Innovation

Clayton Christensen,
Harvard Business School

Key A = Performance that customers can absorb and utilise (mean performance demanded)

B = Performance trajectory of traditional technology driven by sustaining improvements

○ = Point of oversupply

C = New 'disruptive' performance trajectory

D = Significant oversupply by traditional technology creates a vacuum for new proposition

E = Normal distribution of customers by performance demanded

F = New 'potentially disruptive' performance trajectory



the MOOC is a horseless carriage

- MOOCs are fun but there is no business model – take one while there is still time
- Big changes are coming to education, but...
- I bet it will be the low-end producers who have the big impact. The Ms. Twus and the Zoomers will ultimately have more impact than edX
- Big unanswered questions:
 - certification
 - authentication
 - quality assurance
- Big opportunities for physics teachers at high-schools and community colleges.