Why OER?

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Land acknowledgement

Before we begin, I must acknowledge that I learned much of what we'll be talking about today while I was living in the unceded territory of the Ute Peoples. The earliest documented people in that area also include the Apache, Arapaho, Comanche, and Cheyenne. An extended list of tribes with a legacy of occupation there can be found on the Colorado Tribal Acknowledgement List.

I am grateful for the chance to have lived and worked in that beautiful place and will always cherish that memory, even though I am no longer a resident there.[1]

[1] And where I live now there is no tradition of land acknowledgements of which I am aware.

Why?

I want to remind you, in these next 20 minutes or so, of

Why are we doing this work?

Our structure will be to talk a bit about

- ***what*** is "this work,"
- some examples of ***how*** we are doing it, and
- then getting to the ***why?***, for which I will offer some thoughts along the lines of
  - ⇝ OER are a tool we can use to respond to the current economic warfare on students
  - ⇝ OER are a tool to give educators more academic freedom for excellent pedagogy
- Holly has some more stuff to share today about ***where*** to find OER.

An OER definition in Colorado

> ... (6) "Open educational resources" means high-quality teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits free use ~~or~~ AND repurposing by others. ~~and may include other resources that are legally available and available to students for free or very low cost.~~ Open educational resources may include full courses, course materials, modules, textbooks, faculty-created content, streaming videos, exams, software, and other tools, materials, or techniques used to support access to knowledge.[2]

This definition follows the amendments[3] in SB21-215, **Use Of Open Educational Resources In Higher Education**, signed by Governor Jared Polis on 5 May 2021, to the older definition from HB18-1331, **Higher Education Open Educational Resources**, signed by Governor John Hickenlooper on 30 April 2018.

[2] Notice that the term "OER" includes free textbooks.

[3] I feel quite proprietary towards those amendments because I spent an huge amount of time explaining their importance to a legislative aide in 2020.

An OER definition globally

UNESCO unanimously adopted its OER Recommendation on 25 November 2019.

That Recommendation includes the definitions

> *"1. Open Educational Resources (OER) are learning, teaching and research materials in any format and medium that reside in the public domain or are under copyright that have been released under an open license, that permit no-cost access, re-use, re-purpose, adaptation and redistribution by others.*
> *2. Open license refers to a license that respects the intellectual property rights of the copyright owner and provides permissions granting the public the rights to access, re-use, repurpose, adapt and redistribute educational materials."*

Note the similarity to David Wiley's 5Rs of Open[4].

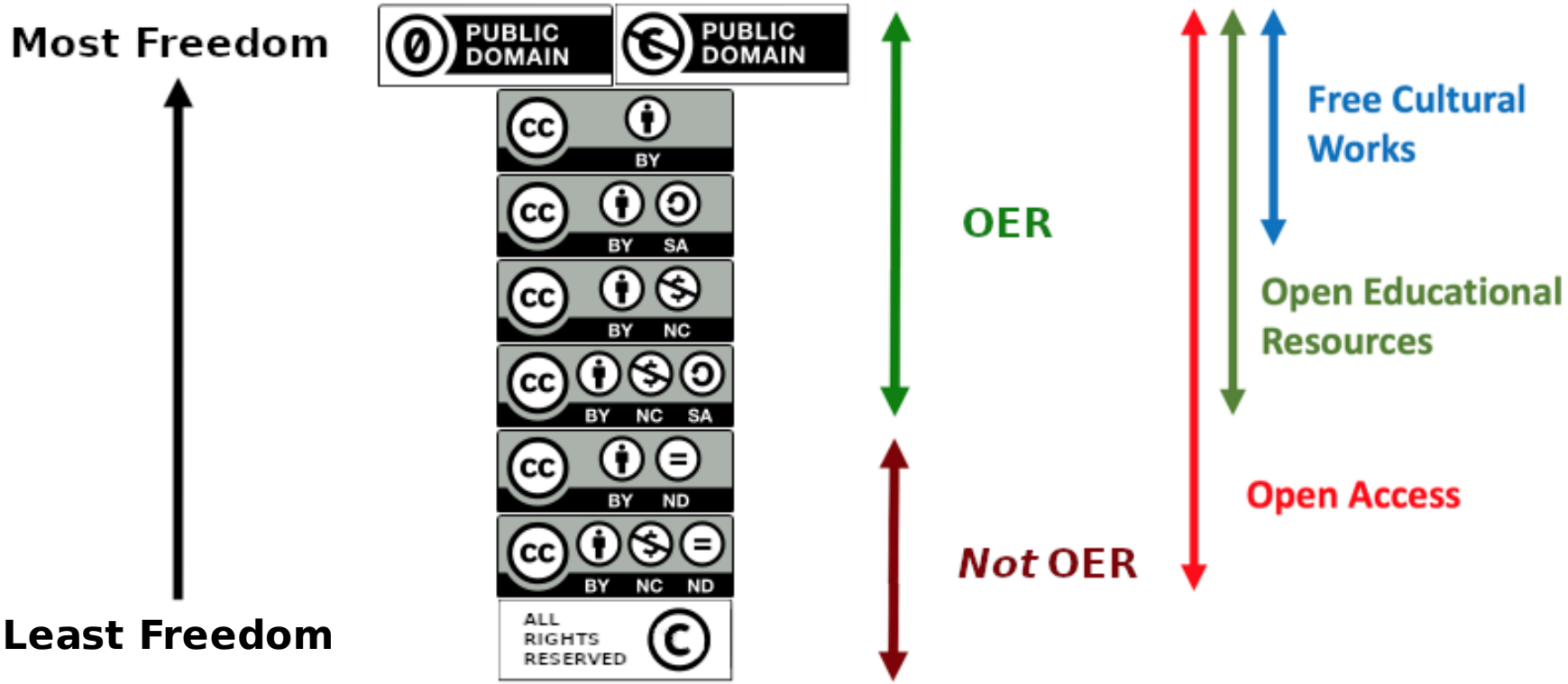
After a confusion of different definitions due to the William and Flora Hewlett Foundation, Creative Commons, different state legislatures, and others, we should take this definition as canonical: 193 countries' diplomats[5] can't be wrong!

[4] These are the rights to **Reuse**, **Retain**, **Revise**, **Remix**, and **Redistribute** an educational resource

[5] Not including the US's: the US withdrew from UNESCO just a few years ago.

The augmented CC license spectrum

Mapping the clauses in that UNESCO OER definition to the CC license suite – augmented by the two CC public domain tools and, because there are still people outside of the open movement, all-rights-reserved copyright – we get:



What about OER to which CC licenses should not be applied?

CC recommends that their licenses not be applied to software. But some OER may incorporate, or even consist almost entirely of, software.

Here are licenses commonly used for FLOSS[6], as collected by the Open Source Initiative:

- Apache License 2.0
- BSD 3-Clause "New" or "Revised" license
- BSD 2-Clause "Simplified" or "FreeBSD" license
- GNU General Public License (GPL)
- GNU Library or "Lesser" General Public License (LGPL)
- MIT license
- Mozilla Public License 2.0
- Common Development and Distribution License
- Eclipse Public License version 2.0

And there are more!

I have not checked which of these satisfy the UNESCO OER Definition, but I do know that the GPL does: it's quite parallel to CC BY-SA. [I always use the GPL on my code.]

[6] FLOSS="Free/Libre/Open-Source Software"

When might those software licenses matter?

Those software licensing considerations apply

- to OER which are simulation, such as the PhET Interactive Simulations for Science and Math
- Jupyter, Mathematica, and Sagemath Notebooks
- problems written in the WeBWorK homework system
- [maybe] H5P tasks
- more? ... after all, "software is eating the world"[7]

[7] as Marc Andreessen, co-author of Mosaic, co-founder of Netscape Communications and of the VC firm Andreessen Horowitz, said in an article Why Software Is Eating The World from 20 August 2011 in The Wall Street Journal.

Licensing issues that come up in OER practice

From the UNESCO (and Colorado) OER definitions, it seems that intellectual property law and copyright licenses are quite important in this work. Here are some licensing issues that I have seen in OER practice:

- Licensing software, as we've just seen
- Who gets to apply a CC license?
- How to do a proper attribution, as required by all Creative Commons licenses with the "BY" clause
- OER and exceptions and limitations to copyright: TASL, TASL, everywhere, and not a drop to drink...
- Collections *vs* adaptations/remixes
- Licenses on collections, adaptations, and remixes

For all of these, it is very much worth[8] your time to take the Creative Commons Certificate course! Or at least do a short training in these topics, or read the (openly licensed) CC Cert course materials[9].

[8] But I am very biased: I facilitate this course frequently for the Creative Commons organization.

[9] Also available in audiobook form – with my voice! – if you want something to listen to while you are otherwise busy cooking or driving or exercising!

How? ...Some examples from my teaching 1

Here are just some examples of how OER and OER-enabled pedagogy have been important in my own teaching:

- **CSUP Math 419**, *Number Theory*, spring 2012: Student-written textbook, using MediaWiki & MathJax, because of poor departmental scheduling.
- **CSUP Math 242**, *MATLAB Computation*, spring 2014: Students use Linux, GNU Octave, other FLOSS tools, because they're just better; early JITERs.
- **CSUP Math 319**, *Number Theory*, spring 2014: OER creation [YAINTT], usually a week ahead of the class, because how hard could it be?
- **CSUP Math 319**, *Number Theory*, spring 2015: OER creation [YAINTT, v2.0], because this should just be polishing by now, right?
- **CSUP Math 411**, *Introduction to Topology*, summer 2015: use and some creation of OER, because this is in my blood, I'm not giving up control to a textbook.
- **CSUP, Math 156**, *Introduction to Statistics*, fall 2016 (one online, one in-person): use of existing OER with my supplements, because of the cost of the commercial book.

How? ...Some examples from my teaching 2

- **Reykjavík U.** *T-[7,8]50-CYCR, Cryptocurrencies*, winter 2016: full-on JITER creation.
- **CSUP, Math 156**, *Introduction to Statistics*, spring 2017 (two sections): OER creation [LDLoS], because this must just be polishing, this time, right?
- **CSUP, Math 345**, *Algorithms and Data Structures*, fall 2018 (two sections): full-on JITER creation.
- **CSUP, CIS 491**, *Special Topics – Cryptology in Python*, spring 2021: OER creation [OWoC], tried PreTeXt, ended up back in LaTeX, oh well.

Above, **JITER** stands for "**Just-In-Time Educational Resource**," a form of OER-enabled pedagogy I spoke about at the last in-person Open Ed Conference, see my slides Getting the JITERs: Just-In-Time Educational Resources as a Mode of OER-enabled Pedagogy.

Why? ...The economic crime against students in the US today

There is really no more public higher education in the United States: how does it make sense to call it "public" when the great majority of the funding at the great majority of public institutions of higher education in the great majority of states in the US comes from tuition?

Additionally, Silicon Valley Bank gets bailed out while a modest student load forgiveness program is hung up in court and may never move forward, even though many studies show that debt forgiveness has broad economic value for the whole community, not just those whose debts are eliminated.[10]

Total higher ed student debt in the United States is a hair less than $2Trillion and is growing every year by more than the GDP of 3/4 ***of the nations on the planet***.

We must add to this picture the crisis in meeting basic needs (housing, food) for today's students, for numbers see many publications at the The Hope Center for College, Community, and Justice.

Textbooks contribute to this intergenerational crime.

[10] Oddly, in the US, debt policy is seen as a *moral* issue. The amazing book **Debt: the First 5,000 Years** by anthropologist David Graeber has many interesting things to say about this.

Yes, Milton, Markets Can Fail 1

Why does standard neoliberal economics fail so badly for textbooks?

Let's look at a bookshelf in my office at the math department at CSU Pueblo, containing mostly books[11] I used as an advanced undergrad and grad student.



[11] And some juggling equipment.

Yes, Milton, Markets Can Fail 2

Books sent to me, **for free, without my asking**, by commercial textbook publishers [thrown under a side table]:



Yes, Milton, Markets Can Fail 3

Online prices[12] (usually far less than our campus bookstore) for some of those books:

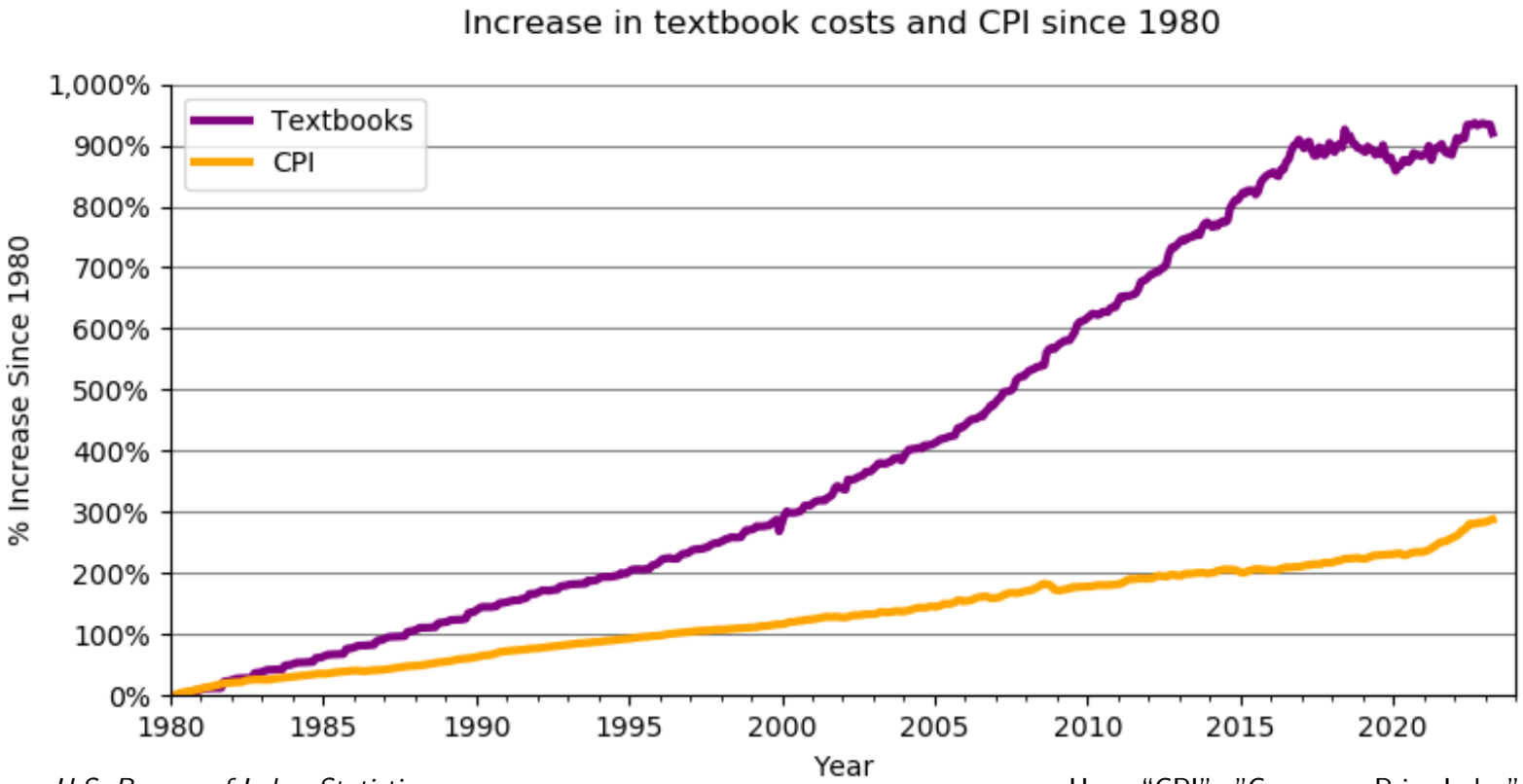


The moral: if you break into my office, don't bother to steal the computer from my desk, take **the textbooks**, they're probably worth more than $10,000!

[12] Note: these prices and pictures are about six or seven years old, since I had to give away most of my unused math books when I moved to an office in the library to work at CSUP's Center for Teaching and Learning.

Yes, Milton, Markets Can Fail 4

Rather than the usual capitalist feedback between buyer and seller, for textbooks the buyer [a student] is different from the decider [the professor]. Indeed, the decider [professor] is given not only free units, but also is bribed by the seller with many other goodies [test banks, homework solution books, PowerPoint decks for classroom use, *etc.*].



Source: *U.S. Bureau of Labor Statistics*.

Here, "CPI"="Consumer Price Index"=inflation.

[13] Images like this, with code and data to produce them, in a blog post of mine: Inflation-adjusted Textbook Pain Multiplier for Decision-Makers.

Why? ..."Better by test"

As Bobby Fischer said about why he started most chess games with 1.e4,[14] openness in knowledge and learning is just "Better by test." That is, the test of literally millennia of experience shows ***open is just better***.

For example, despite the glorification of the entrepreneurial spirit, venture capital, and the start-up culture, FLOSS software runs on far more silicon CPUs than does commercial software. FLOSS built and continues to run most of the internet. And for almost every piece of commercial software, there is a FLOSS equivalent which is actually much more powerful, secure, and feature-rich.[15]

I like to tell a story of the history of the open *vs.* closed debate that has beautiful illustrations from *The School of Athens* by Raffaello Sanzio da Urbino.



Image in the public domain: Raffaello died in 1520. Original in the *Stanza della Segnatura* in the Vatican. This version is from Wikimedia Commons

[14] otherwise known as "pawn to king four"

[15] I honestly don't know why academics use commercial software, it seems insane. True, FLOSS tends to have a steeper learning curve than the (inferior) commercial equivalents – but we are *learning professionals*, learning hard stuff is our happy place!!!

Pythagoras: Keeping Knowledge Secret on Pain of Death



He didn't prove or originate "his" theorem.

The *Pythagoreans* were not unlike a *cult*, with odd dietary restrictions, belief in their leader's magical powers (talking to animals, *etc.*), divided as:

- *mathematikoi* ["learners"] who lived apart and knew hidden mysteries (*e.g.*, that $\sqrt{2}$ is irrational[16]); and
- *akousmatikoi* ["listeners"] who lived with their families and only aspired to greater secrets.

Hippasus of Metapontum, a renegade mathematikos, was tracked down and executed for the crime of revealing to the public that $\sqrt{2}$ is irrational.

[Pythagoras himself was killed when unwilling to step into a bean field despite being pursued by an angry mob.]

[16] meaning that there do not exist whole numbers p and q such that $\sqrt{2} = p/q$

Euclid's Radical Openness

He was a librarian.[17]

His *Elements of Geometry* had more editions and influence than any other book in the West [other than the Christian Bible].
The Elements was loved by Galileo, Newton, Hobbes, Spinoza, Descartes, Abraham Lincoln, Albert Einstein ... and many, many others[18]
For millennia it was considered a rite of passage in the West in the education young people to master *The Elements*.
The Elements was so influential because it was completely open, laying out all of its Theorems ***with proofs*** [including one that $\sqrt{2} \notin \mathbb{Q}$].



Proofs are like like the source code if a theorem were a program: Yes, Euclid was doing FLOSS more than 2K years before the invention of the computer!

[17] in Ptolemaic Alexandria. Although, actually, what we usually call *The Library of Alexandria* was really better thought of as, and was called, a *museum*, in that it was a place that the Muses hung out.

[18] *E.g., Moby Dick* says that the difficulty of whales mentally putting together the two images perceived by their widely separated eyes must be as if a human were "simultaneously to go through the demonstrations of two distinct problems in Euclid."

Academic freedom and pedagogical innovation

When I first started doing OER and Open Pedagogy, I think I was too timid.

I celebrated the use of a open textbook, by which I would never again have to ignore that damn typo on page 317 of a commercial book, or the misleading example in chapter 7 which confused more students than it helped, or the missing diagram which is the main way I hope students will understand a key concept and which is unaccountably missing from the (commercial) textbook – in an OER, I would just make those changes myself!

But I think a more important thing about OER is that, (by adopting/adapting/creating [**AACing**][19] an appropriate OER)), I can have a resources which truly supports any pedagogical innovation I am developing.

Want to use a *mastery grading* approach to ungrading[20] and need a book tailored to that? Aac a book that does that. [My OER OWoC does that in cryptology.]

Want students to construct their own critical insights to short stories in the literature class you are teaching? Use the same structure and/or adapt Robin DeRosa's The Open Anthology of Earlier American Literature.

Or any of many other approaches you think of, or you find in the Open Pedagogy Notebook....

[19] I'm trying to get OER folks to use the verb "to aac", pronounced like "ace," for this common open ed combination.

[20] Recently, I've been doing **ungrading** as much as I can – I love it! If you haven't tried, I strongly suggest you read Susan Blum's book **UNgrading: Why Rating Students Undermines Learning (and What to Do Instead)**.

Last, but most important: *Social Justice* 1

Despite the terrifying dystopia quotient in the news I read these days, I believe a better world is possible.

I also believe that education is absolutely one of the most powerful tools we have to make a better world. – That's why fascists today are taking books out of school and community libraries and restricting what topics teachers can share with their students.

Teaching Critical Race Theory as one important social theory among many others (as my wife did for years in the Colorado College Sociology Department) out of an OER is not likely to be more legal than it would be to teach out of a commercial textbook: that is a battle individual professors in the states where this is happening will fight however they choose. But commercial textbooks will likely cave to pressure on these complex topics immediately, so an OER may be the only possible source for some topics, soon.

And even when avoiding hot-button culture war issues, when we aac open resources, we can make the representations of people of color be more fair and truthful, celebrate the achievements in our different disciplines of traditionally marginalized peoples, and actively work to be antiracist and anticolonialist.

A better world is possible

Even in a supposedly neutral and abstract field like the mathematics that I teach, I can[21] ask my students to think about the logic of a politician's argument, or to design a statistical survey which would give some precise meaning to the terms of a current matter of public debate.

I aac my OER on these important questions not to tell the students what they should think, but to help them see that they **can** think, that they can reason about the world with the tools and knowledge they are learning in school. I have to believe that makes the world a better place.

> *"The classroom, with all its limitations, remains a location of possibility. In that field of possibility we have the opportunity to labor for freedom, to demand of ourselves and our comrades, an openness of mind and heart that allows us to face reality even as we collectively imagine ways to move beyond boundaries, to transgress. This is education as the practice of freedom."*
>
> **Teaching to Transgress**, bell hooks, 1994, p.207

[21] and do, *e.g.*, in LDLoS – an otherwise rather unremarkable statistics textbook

Summary and contact info

Summary [AKA "the tl;dr"]:

- OER defs in CO and by UNESCO
- CC license "spectrum"
- different licenses for software
- lots of fun OER/OEP examples by JP
- "JITERs"
- broken market leads to textbook cost
- the internet runs on FLOSS
- openness in T&L "better by test"
- Pythagoras was a murderous weirdo
- Euclid was *fabulous*
- OER/OEP $\Rightarrow$ academic freedom
- OER/OEP $\Rightarrow$ education for social justice
- A better world is possible!

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