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*2019 Open Education  
Symposium:  
Lightning Talks*

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[guides.lib.vt.edu/oer/oeweek](https://guides.lib.vt.edu/oer/oeweek)  
#OEWeek  
@OPENatVT



UNIVERSITY LIBRARIES  
VIRGINIA TECH.

# The Career Center and Open Education

*In theory, what concepts unite these two topics?*

- **Structural and functional parallels between library and career center:** teaching students how to navigate information across media
- **The glitch:** encounter with a barrier, breakdown, or failure (see: Saum-Pascual 2017 and Mattern 2018); discovery that access to **personality inventories or interest assessments** often lies behind a paywall
- **Potential for resources:** look to history of open access academic publishing to explore the possibilities of **creating an infrastructure of accessibility without losing quality**

*In practice, what place does open education have in career centers?*

- **Information literacy:** teaching how to **consider the potential biases, assumptions, and implications of materials and to question notions of expertise, skill(s), and authority in the context of their own careers**
- **DH values:** the career center as site to **prioritize diversity, collaboration, and experimentation in the spirit of a community of practice** (see: Spiro 2016) and **express an ethos of openness**
- **Potential barriers or limitations?**

Gold, Matthew, and Lauren Klein, ed. *Debates in the Digital Humanities*. Minneapolis: University of Minnesota Press, 2016.

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Audio

# Open Learning '19: a cMOOC

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- Pre-MOOC week starts March 10<sup>th</sup>
- Three weeks of Open Learning content: March 17<sup>th</sup>-April 6
  - Open Access and OER
  - Open Pedagogy
  - Open Faculty Development





# Writing and Publishing OER for an Upper-Level Genetics Course

Christine H. Terry, Ph.D. Associate Professor of Biology

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## Abstract

Use of open educational resources (OER) in academia is rapidly gaining momentum; much of this activity is happening at two-year colleges, which currently provide more than 80 all-OER degree programs. Large research universities are also stimulating OER growth by providing incentives to their faculty to develop and use open materials in their courses. To maximize impact, much of this growth has centered on introductory courses which typically have the largest enrollments on campus. In Virginia, multiple consortia are working to inform and educate faculty about the existence and benefits of using OER in their classrooms. Creating OER can be especially challenging for faculty at small, private, primarily undergraduate academic institutions, who cannot easily obtain the necessary resources (financial, teaching release, etc) to create these materials. Therefore, adoption of existing open textbooks is the most straightforward way to integrate OER into a course. These are readily available for introductory science courses (such as chemistry and biology), however, there is a dearth of OER in upper-level science courses. I am using my current sabbatical to write open access material for a majors-level genetics course. My proposed work includes three stand-alone chapters on rapidly evolving topics, that are not well covered in most undergraduate genetics textbooks; these topics include: (i.) epigenetics, (ii.) discovering genes involved in multi-factorial traits, and (iii.) ethical and social issues in the age of genomic research. Publishing this information in an open text format lends itself to being easily updated. Initially, I plan to use these chapters to supplement our traditional genetics textbook. I expect to learn aspects of OER publishing that will allow me to collaborate or even spearhead a full-length open genetics text. This presentation will provide insight into writing open text chapters to complement traditionally published textbooks.

## Background/Rationale

- Learned about use and availability of OER at an Open Textbook workshop (Sweet Briar College, May 2017)
  - A typical college student spends \$1,230 to \$1,390 on books and supplies per year (College Board, 2017).
  - Two-thirds of college students choose not to buy at least one textbook due to its cost, even though they believed this decision would negatively affect their grade (Senack, 2014).
  - In the last 30 years, textbook prices have increased at over 3x the rate of the consumer price index (CPI).
  - Open textbooks allow students to access educational material and resources online for free and can often be printed at a low cost if students prefer a paper copy.
- Students perceive open texts to be as effective as traditional texts
  - Allen *et al* (2015); Illowsky *et al* (2016); and Fisher (2018)
- Cost of undergraduate genetics textbook: \$130 to \$200
- Use sabbatical leave to write OER materials for genetics course
  - Write supplemental chapters to enhance traditional text
  - Learn ins and outs of OER publishing
  - Form partnerships to create/modify a full-length text

## Facilitating OER Development

- Create supplemental material
  - Stand-alone chapters
  - Learn about OER publishing
- Institutional Support
  - Sabbatical leave
  - Library staff
  - Teaching + Learning Center
- Student involvement
  - Independent study
- Faculty collaborations
  - School of Sciences (SOS)
  - OER Initiative at CVCC
  - Collaborators at other institutions?
- Recent use of OER in other SOS courses
  - General Chemistry
  - Introductory Physics
  - Cell Diversity



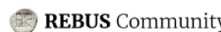
## Realities of Creating & Using OER

- Difficult to find full-length upper-level texts
  - Lack of complete central repository
    - Especially true for modified works
- Limited resources for creating OER Texts
  - Teaching load (4:4)
  - Course release (rare)
- Logistics of creating & modifying OER
  - Different formats (epub, html, pdf, etc.)
  - Creative Commons licensing
- Illustrating important concepts
  - Modifying existing images
  - Determining copyright
  - Creating new images

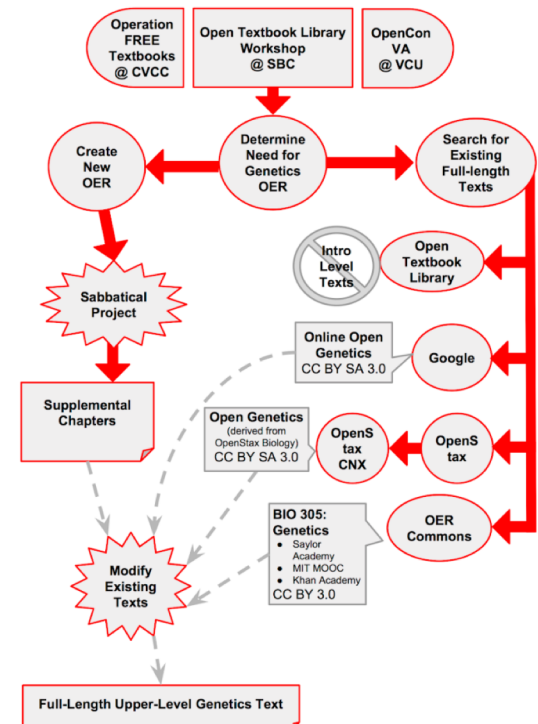


## Available Resources

- Virginia's Academic Library Consortium (VIVA)
  - VIVA Faculty Textbook Portal (<https://bit.ly/2lrU8p>)
- Open Textbook Library
  - <https://open.umn.edu/opentextbooks/>
  - Resources for OER authors
    - Modifying an Open Textbook
    - Authoring Open Textbooks
- OpenCon Virginia
  - Annual OER conference @ VCU
- Operation Free Textbooks
  - OER Conference @ CVCC
- Rebus Community
  - <https://forum.rebus.community/>
- OpenStax
  - Peer-reviewed, open license textbooks
  - CNX: Community-created content
- Creative Commons
  - <https://creativecommons.org>
- OER Commons
  - <https://www.oercommons.org/>



## My Journey into OER



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## Images

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Created by Cantasia from Noun Project

# Class Book Projects



by Robert Browder



Created by Stephen Borengasser from Noun Project

**Organizing the project is key. Students can do it! They'll need to:**



- Choose a topic
- Assign Roles
- Assign Tasks
- Set a Schedule



Created by Barbara Lavinia from Noun Project

**What are the roles in a book project anyway?**

- Project Manager - instructor
- Editor(s) - 1 or 2 students
- Proof Readers - 3 or 4 students
- Authors - all students

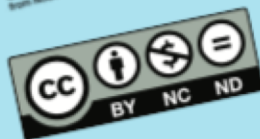
**Creating a book with your class provides numerous opportunities for research, learning, and development of real world team skills.**

**How will content be structured?**

Will all students write a chapter on the same topic to create an edited volume?  
Or will students work together to create a comprehensive volume?



Created by Ghazi Karim from Noun Project



**What about the intellectual property?**

Exactly! What about it?

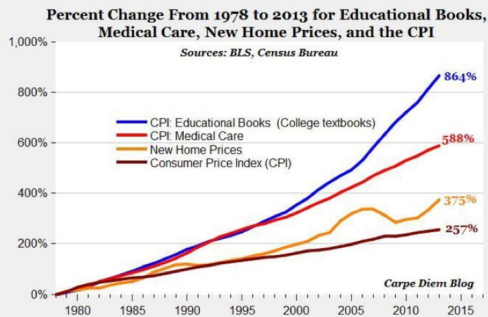
Have your students research copyright and licensing and share their findings with the class : )

**Areas of learning**

- Collaboration
- Technology
- Crafting
- Design
- Scholarship
- Editorial Style
- Professional development
- Communication
- Process
- Peer review
- Debate
- Story telling

# Great for All Ages!

## Textbook costs in higher education



Bureau of Labor Statistics, 2016

2012	2016	
63.6%	66.5%	Not purchase the required textbook
49.2%	47.6%	Take fewer courses
45.1%	45.5%	Not register for a specific course
33.9%	37.6%	Earn a poor grade
26.7%	26.1%	Drop a course
17.0%	19.8%	Fail a course

Florida Virtual Campus, 2016



Open Science Logo by [Greg Emmerich cc-by-sa 2.0](#)



OER Logo Open Educational Resources by [Markus Busges cc-by-sa 4.0](#)

## Textbook costs in social work

Online, anonymous survey distributed by faculty and administrators at participating institutions.

Wave 1: Virginia schools of social work

Wave 2: US schools of social work

Research Questions:

1. What is the textbook cost burden of a social work education?
2. How does textbook cost burden affect the academic performance and learning experience of social work students?
3. Does textbook cost burden disparately affect students from oppressed and historically underrepresented groups?
4. How do students conceptualize and perceive textbook costs?

## OER creation

Anonymize data and publish to the Open Science Framework page.

Create quantitative and qualitative data analysis exercises that use our textbook cost data.

Integrate open science lesson and textbook cost study in an OER textbook on research methods.

## Future directions

Annual textbook cost report.

Involving students in data collection and analysis.

Use campus-specific data to help spark OER adoption and creation at participating institutions.

# Open, Accessible, Reusable: Creating an Open Learning Object Repository for Learners and Educators

Lisa Becksford and Kayla B. McNabb, Virginia Tech

## WHAT IS ODYSSEY?

Odyssey is an open collection of tutorials, videos, and other learning materials created and maintained by the University Libraries at Virginia Tech. Odyssey's content is dedicated to all aspects of library instruction, including data, digital, and information literacy; undergraduate research; and more:

- 45 videos
- 10 handouts
- 9 interactive tutorials

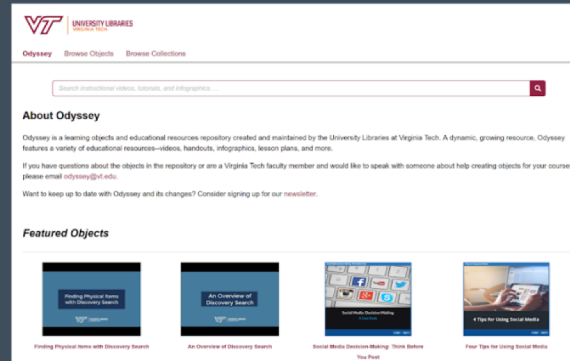
While some items are VT-specific, many others are applicable to all learners.

## WHY ODYSSEY?

Odyssey was created in part because it can be hard to find free, high-quality, openly-licensed educational content to teach research skills and data, digital, and information literacy concepts. Beyond YouTube, it's hard to find other types of learning materials, like interactive tutorials. Odyssey brings these different formats together, and the use of Creative Commons licenses makes it clear that the content can be reused. Other repositories contain content from nearly every discipline imaginable, but Odyssey is unique in its narrow scope, making it easier for users looking for this kind of content to find what they need.

While Odyssey was designed to serve the needs of the Virginia Tech community, its content could be useful for learners and educators across the globe. In this way, Odyssey helps Virginia Tech fulfill its mission of being a global land-grant university.

## ODYSSEY HOMEPAGE



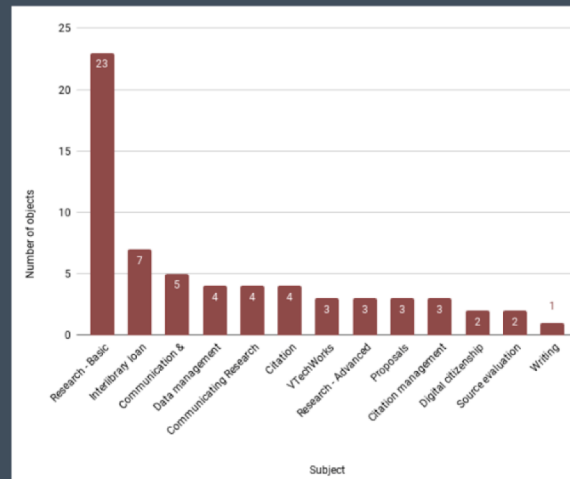
## WHY OPEN CONTENT?

We value openness, accessibility, and reusability, and we want to offer unique content to support learning. It's important for Odyssey to be as open as possible to help fulfill VT's mission and address the difficulties mentioned earlier. To be in Odyssey, objects must have a Creative Commons license, and most have a simple attribution license. This license allows educators to take our objects and integrate them directly into their contexts or use our work as the basis for a resource that will better fit the needs of their students, including adapting materials to address any number of additional accessibility needs.

## WHERE TO NEXT?

We will continue to evaluate the content needs of our community. Next steps include developing more broadly applicable content, such as resources for grant submissions and research ethics, as well as resources to support the reuse and repurposing of Odyssey's materials, including educator guides to make it easier to customize and/or curate our objects. Our objects' accessibility has been important from the beginning, and our web interface will undergo its own full accessibility review over the next year. Finally, we have primarily promoted Odyssey locally so far. This year, we will look for opportunities to promote beyond our campus community and hope to work closely with a wide range of partners.

## CONTENT DETAILS



## WANT TO LEARN MORE?

Website: [odyssey.lib.vt.edu](http://odyssey.lib.vt.edu)  
Email: [odyssey@vt.edu](mailto:odyssey@vt.edu)



# No graphing calculators, no license fees

## Free software for the mathematics classroom and beyond

Jason Lachniet, Wytheville Community College



### What is free and open source software?

In the free software community, the word 'free' does not simply mean no cost, but indicates more broadly that the software respects the user's essential freedoms to use, share, study the code, and modify the program. The definition below is provided by the Free Software Foundation (Stallman, 2002).

"A program is free software if the program's users have the four essential freedoms:

1. The freedom to run the program as you wish, for any purpose.
1. The freedom to study how the program works, and change it so it does your computing as you wish. Access to the source code is a precondition for this.
2. The freedom to redistribute copies so you can help others.
3. The freedom to distribute copies of your modified versions to others. By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this."

In an academic setting, free software (available at no cost) improves equity and student access, and the freedom to view, modify, and share software code makes research more transparent.

### Use of technology in the mathematics classroom

Do we need technology in the mathematics classroom? Views vary widely by department, instructor, and specific course, but certainly some applied problems cannot be practically solved without technology.

The recent Math Pathways course redesign project in the Virginia Community College System surveyed four-year public colleges in Virginia and collected data on freshman and sophomore level mathematics courses (VCCS, 2019).

#### Summary of survey results:

- Limited to no use of calculators in in-class assessments
- Graphing calculator and/or computer technology for projects
- TI-83/84 calculators in introductory statistics classes
- Minitab, SPSS, StatCrunch, or R in higher level statistics
- Mathematica, Maple, and MATLAB in calculus, linear algebra and differential equations

Most of this software and calculator technology is closed-course and expensive (for both departments and students). Fortunately, free software alternatives exist!

Proprietary	Free software alternative
TI-83/84	GeoGebra and/or LibreOffice Calc
Excel	LibreOffice Calc
StatCrunch	LibreOffice Calc or PSPP
Minitab, SPSS	PSPP or R
MATLAB	GNU Octave
Mathematica	SageMath or Python/SciPy
Maple	SageMath or Python/SciPy



### Limitations and available resources

- Free software documentation is sometimes not as complete as for commercial software.
- To be able to compete with proprietary software, free software needs good free documentation.
- Many textbooks and ancillary materials support non-free, non-open software and calculator technology (sometimes even OER books do this!).
- For educational use, a cryptic software manual understandable only to specialists is not enough.
- Openly licensed free textbooks that include free software instruction or supplements that reference free software are ideal - and many are now available (Bard, 2015; Barr, Diez, & Çetinkaya-Rundel, 2010; Lachniet, 2016; Venables & Smith, 2018; Zimmermann, et al., 2018).
- Free or not, any technology-based approach to a problem has the potential to detract from the more important mathematical concepts, by focusing too much time and energy on learning the technology tools. Some free software has a steep learning curve, making this a particular concern, for example if attempting to use command line-driven R in an introductory statistics course or Python in a freshman calculus class.

### Quantitative reasoning, precalculus, applied calculus

#### GeoGebra/Desmos

Explore functions visually, without devoting time to learning specialized software to do so.

- Graphing functions, solving equations graphically
- Finding points of intersection, maximums, minimums, etc.
- Plotting points, linear regression

GeoGebra is free software with source code released under the GNU General Public License.

Desmos.com is not free as defined above, or open source. It is still included here because of growing popularity, free (no cost) access for students, and ease of use - this well designed and easy to use web-based app may be the tool that finally ends the dominance of the TI-83/84 in secondary education (Loewus, 2017).



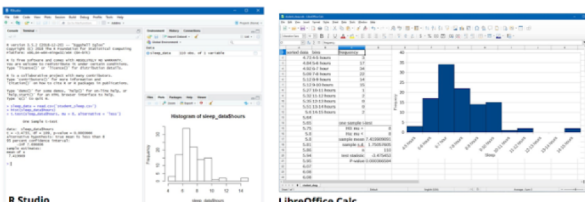
GeoGebra Graphing Calculator

#### OpenOffice Calc/LibreOffice Calc

Complete numeric calculations, easily produce visual displays of data, or do basic statistical analysis - without devoting much time to learning specialized software.

- Great for general usage; spreadsheets are widely used in many professional settings
- Repetitive numeric calculations: amortize a loan, guess the value of a limit based on numeric evidence, estimate a definite integral with a quadrature rule, etc
- Generate a truth table with logical functions
- Create visual displays of data
- Statistical distributions, regression, confidence intervals, hypothesis tests

Free software released under the Mozilla Public License.



R Studio

LibreOffice Calc

### Statistics

#### PSPP

Use it as a free replacement for SPSS, using a similar interface and equivalent syntax.

- Visual displays of data
- Statistical distributions, regression, confidence intervals, hypothesis tests
- Comprehensive users' manual available (Free Software Foundation, 2018)

Free software released under the GNU General Public License.

#### R

Steep learning curve, but very powerful. Use it if your students need to develop proficiency in high-level statistical analysis for research purposes.

- Visual displays of data
- Statistical distributions, regression, confidence intervals, hypothesis tests
- Numerous textbooks with R instructions or labs available (Barr, Diez, & Çetinkaya-Rundel, 2010; Venables & Smith, 2018)

Free software released under the GNU General Public License.

### Higher level mathematics and engineering

#### GNU Octave

Use it for general numerical calculations and visualization, especially if MATLAB programming skills are useful in your field (e.g., engineering).

- Standard MATLAB-style syntax, runs most M-files
- Solve all types of numerical problems, linear systems, differential equations, plotting, etc.

• Symbolic Package allows Octave to function as a CAS  
Free software released under the GNU General Public License.



GNU Octave

#### SageMath and Python

Use it if your students already have Python-specific, or at least some, computer programming background, or if Python programming skill will be useful in their field (Python is useful).

- SageMath is built on top of Python and uses mostly standard Python syntax
- Many existing open source packages are integrated and accessible in SageMath
- Sage has a few convenient syntactical conventions for mathematics that differ from pure Python, and access to some operations not easily run directly from Python
- But, 'plain Python,' together with scientific packages like NumPy, SymPy, and Matplotlib, is growing in popularity and is a viable alternative for many applications
- Interactive Jupyter notebooks using Sage and/or Python show potential to change how research is published (Somers, 2018)

Python is free software released under the Python Software Foundation License (a permissive BSD-style license compatible with the GNU GPL). SageMath is free software released under the GNU General Public License.

#### Comparison of Octave and Python SciPy syntax

```

Python 3
# solve a square linear system
import numpy as np
A = np.array([[2, 3], [0, -1, 0]])
b = np.array([4], [6], [0]])
sol = np.linalg.solve(A, b)
print(sol)
ans = [ 5.66666667
        5.66666667
        -4.33333333]

# simple 2d function plot
import matplotlib.pyplot as plt
x = np.linspace(0, 2*np.pi, 50)
y = np.sin(x)
plt.plot(x, y)
plt.show()

# graph of a surface
from mpl_toolkits.mplot3d import Axes3D
x = np.linspace(-3, 3, 25)
y = x.copy()
z = y + np.exp(np.log(x, y))
Z = x**2 - y**2
ax = plt.axes(projection='3d')
ax.plot_surface(x, y, z)
plt.show()

GNU Octave
# solve a square linear system
A = [ 2 3; 0 -1; 1 -0 ]
b = [ 4; 6; 0 ]
A\b
ans = [ 5.66666667
        5.66666667
        -4.33333333 ]

# simple 2d function plot
x = linspace(0, 2*pi, 50);
y = sin(x);
plot(x, y)

# graph of a surface
x = linspace(-3, 3, 25);
y = x;
[X, Y] = meshgrid(x, y);
Z = X.^2 - Y.^2;
surf(X, Y, Z)

```

#### SageMath Jupyter Interactive Notebook



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# A Discussion on the Use of Open Educational Resources on Campus

Britton Hipple, Darren Maczka, Sarah Donnelly, Leanna Ireland

<https://blogs.lt.vt.edu/preplab/>

Home About Meet the Team Prototype Proposals How To Use Login Submit Content Report Errors Project Support

# Preplab

Home

We will be at the 2019 Open Education Symposium on March 4th!

*2019 Open Education Symposium*  
Expanding Open Education  
in Colleges & Universities

**This project is supported by:**

