

2019 Open Education Symposium Poster Session

**Conference
Proceedings**

March 4th, 2019

Newman Library Multipurpose Room | March 4th, 2019

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Newman Library Multipurpose Room | March 4th, 2019

2019 Open Education Symposium Poster Session

Introduction

The 2019 Open Education Symposium is in celebration of [Open Education Week](#), an internationally recognized initiative sponsored by the Open Education Consortium with the goal of raising awareness of open education.

The theme of the 2019 Open Education Symposium at Virginia Tech is “Expanding Open Education in Colleges & Universities.” Supporting topics include open educational practices and open pedagogy; connecting the opens; student perspectives; and policies and strategies for open education in formal educational spaces.

The poster session includes faculty, instructional designers, graduate students, and librarians from six institutions of higher education will briefly present an overview of peer-reviewed posters on diverse topics including: Creating open educational resources, linking open education and the career center, a cMOOC for exploring open education, class book projects, introduction to an open learning object repository, open software for graphic, and campus responses to the use of open educational resources. Further details about the 2019 Open Education Symposium can be found at <https://guides.lib.vt.edu/oer/oeweek>.

March 4th - Newman Library, 1st Floor Multipurpose Room
1:30pm Opening Remarks
1:35pm Lightning round presentations
1:50-3:30pm Poster presentations and refreshments

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.
Mattern, Shannon. "Maintenance and Care," *Places Journal*, November 2018. Accessed 10 Dec 2018. <https://placesjournal.org/article/maintenance-and-care/>.
Saum-Pascual, Alex. "Teaching Electronic Literature as Digital Humanities: A Proposal." *DHQ* 11, no. 3 (2017). <http://www.digitalhumanities.org/dhq/vol/11/3/000314/000314.html>.

The Career Center and Open Education

Garnett Kinniburgh

Abstract: Openness, a key principle and practice of digital and critical pedagogy, continues to take hold in university classrooms and libraries across the United States. This presentation considers ways in which the values of the open might inform the futures of another area of the American university: career services. The career center and library may have similar functions — providing access to resources, fostering skill development, offering guidance for future paths — yet ongoing conversations about information, media, data, and digital literacies have largely overlooked the career center. To bring this new site of knowledge (and those who work in it) into conversations about open education, this presentation begins with notions of the glitch or the breakdown in the spirit of Alex Saum-Pascual and Sharon Mattern. In the context of career development, the glitch refers to the moment in which students encounter the limits of their individual resources, frequently in the discovery that career interest assessments and personality inventories lie beyond paywalls. The career center is in a unique position to eliminate that particular barrier for students, a position that deserves closer examination. This presentation then explores the potential for the career center to take a role in teaching information literacy, with the Association of College and Research Libraries' Framework for Information Literacy for Higher Education providing a valuable starting point for this conversation. This presentation concludes with an overview of Lisa Spiro's proposed values for digital humanities as a community of practice and a call for these values to enter the space of the career center. This work is particularly important for institutions that may not have access to the funding or personnel to invest in large-scale open education initiatives at this point but still wish to convey the values of open education to their community.

Keywords: career development; open education; community; information literacy

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

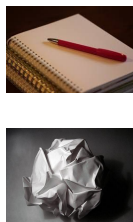
Facilitating OER Development

- 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

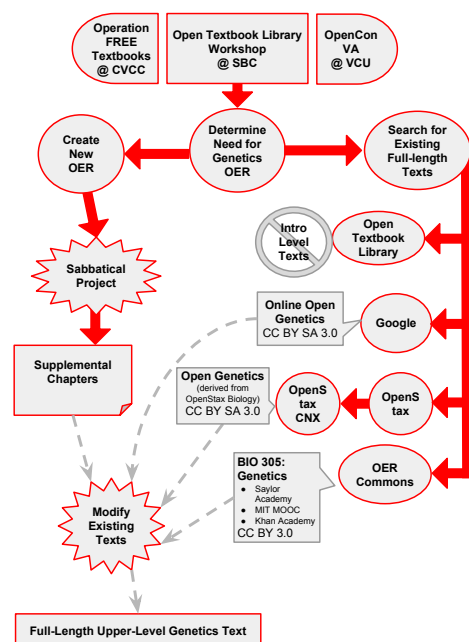
- <https://creativecommons.org>

OER Commons

- <https://www.oercommons.org/>



My Journey into OER



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Images

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Writing and Publishing OER for an Upper-Level Genetics Course

Christine H. Terry, Ph.D.

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. Therefore, 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.

Keywords: genetics; chapter; OER; open textbook; upper-level

Open Learning '19: a cMOOC

Join us March 17th!



Then



- An AAC&U funded Faculty Collaboratives project led by a Steering Committee of 10 faculty & administrators from across VA
- Open Learning '17 was an immersive learning experience of 13 weeks
- Most participants were teaching faculty

Now

- An independent project led by 3 members of the original Steering Committee
- Open Learning '19 is 3-weeks, plus a pre-cMOOC week for those new to connected learning or MOOCs
- Participants in Open Learning '18 were mostly instructional designers & librarians; we hope to get an even broader range for '19
- Week 1: Open Access & OER; Week 2: Open Pedagogy; Week 3: Open Faculty Development

Constants: Blog syndication | Twitter chats | Readings | Community-building

Sue Erickson, Open Learning '19 Hub Director
@SueErickson10 | sueerickson.com

Open Learning '19: a cMOOC

Sue Erickson

Abstract: This lightning talk (and poster) will discuss how the upcoming iteration of the “Open Learning” connectivist MOOC builds on what we’ve learned from offering the cMOOC in 2017 and 2018. The project began as a Faculty Collaboratives initiative, sponsored by the Association of American Colleges and Universities, with project administration supplied by the State Council for Higher Education in Virginia (SCHEV) It sought to create sustainable networks for professional development related to the AAC&U’s “Liberal Education and America’s Promise” (LEAP) signature program. Now an independent project supported by three faculty across Virginia, Open Learning '19 will provide a more condensed connected learning experience over a three week period this spring. Open Learning '19 is for anyone interested in exploring issues in Open Education. The cMOOC will offer both synchronous and asynchronous activities for participants to engage with each other and with issues around open learning.

Keywords: open learning; open education; pedagogy; networks



Created by Cantasia from Noun Project

Class Book Projects

by Robert Browder



Created by Stephen Borengasser from Noun Project

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

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

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



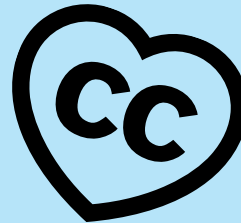
Created by Gianluca Lanzetta from Noun Project

What are the roles in a book project anyway?

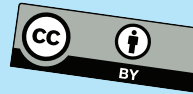
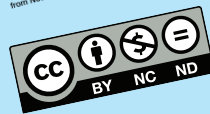
- Project Manager - instructor
- Editor(s) - 1 or 2 students
- Proof Readers - 3 or 4 students
- Authors - all students

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 Shiori Kawada 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!

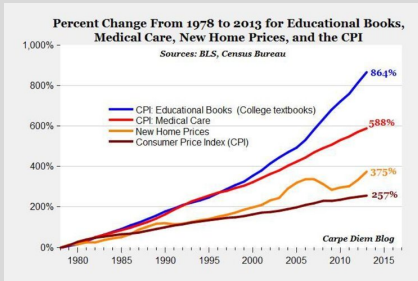
Class Book Projects and Collaborative Technologies

Robert Browder

Abstract: Leveraging collaborative technology to explore the publishing process through class book projects creates opportunities for students to learn about research, authorship, editorship, the peer review process, intellectual property rights and licensing, and last but not least, the value of team work. Structuring a class book project is easy when roles and responsibilities are clearly defined. Collaborative technology can help organize the group, organize the work, and minimize the technical processes of creating the physical publication. In my poster, I will provide a model for class book projects including roles, responsibilities, processes, and useful technologies.

Keywords: open pedagogy; collaboration; publishing; scholarly communication

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.

Connecting the Opens: Open Science, OER Creation, and OER Advocacy

Matt DeCarlo

Abstract: During the spring 2019 semester, the presenter and a colleague are collecting data on textbook cost burdens among social work students. After data collection is complete and the data are anonymized, the researchers will share their data in the Center for Open Science repository. In this short talk, the researchers will describe their plans to integrate this data into an OER textbook on research methods. The proposed OER content will consist of practice questions for qualitative and quantitative data analysis. Because the material will be of high relevance to social work students, the authors anticipate that students will be more engaged in the data analysis process. Furthermore, the authors will create textbook content reviewing and modeling best practices in sharing open data and conducting scientific inquiry in the open. Future directions for the project include collaborative annotation from students on the final report and soliciting feedback on the measures used in the study.

Keywords: Textbook cost; OER; open science

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

Lisa Becksford and Kayla B. McNabb, Virginia Tech

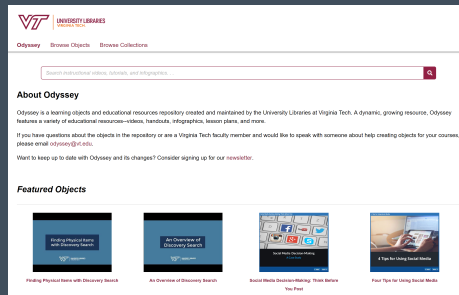
WHAT IS ODYSSEY?

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.

ODYSSEY HOMEPAGE



WHY OPEN CONTENT?

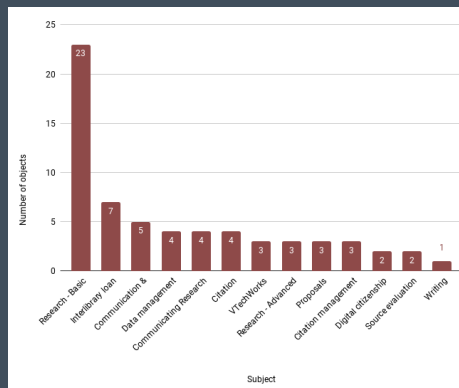
We value openness, accessibility, and reusability, and we want to offer unique content to support learning. It's important for Odyssey to be as open as possible to help fulfill VT's mission and address the difficulties mentioned earlier. To be in Odyssey, objects must have a Creative Commons license, 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.

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.

CONTENT DETAILS



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.

WANT TO LEARN MORE?

Website: odyssey.lib.vt.edu
Email: odyssey@vt.edu



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

Kayla B. McNabb and Lisa Becksford

Abstract: Odyssey is an open learning object repository created and maintained by the University Libraries at Virginia Tech; it features tutorials, videos, and handouts related to many aspects of library instruction, including data, digital, and information literacy and undergraduate research. This poster will describe Odyssey's story and mission to this point and explore Odyssey's next steps and goals. While Odyssey was created in response to specific needs at Virginia Tech, the vision for it has broadened to address the needs of learners across the world. Because it contains open, accessible, and reusable content, the repository addresses the difficulty that many instructors have in finding appropriately-licensed content that they can repurpose or adapt for their classes, regardless of location or accessibility needs. As an open repository, Odyssey helps Virginia Tech fulfill its land-grant mission, both locally and globally. Next steps include further development of broadly applicable content as well as resources to support the reuse and repurposing of Odyssey's materials in a variety of contexts.

Keywords: learning objects, open educational resources, library instruction



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:
 0. 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 on 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

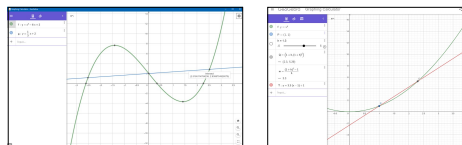
- Free software documentation is sometimes not as complete as for commercial software.
- To be able to compete with proprietary software, free software needs good free documentation.
- Many textbooks and ancillary materials support non-free, non-open software and calculator technology (sometimes even 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 (Barr, 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).



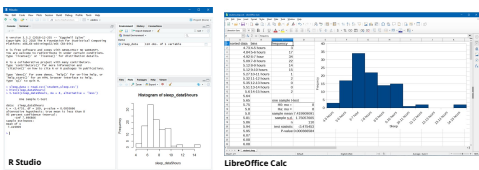
GeoGebra Graphing Calculator

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.



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.

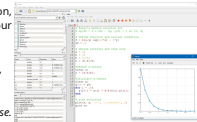
Higher level mathematics and engineering

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 = [[ 2, 3, 0, -2, -4],
     [-1, 2, -1, 0, 1],
     [0, -1, 0, 0, 0],
     [0, 0, 0, 0, 0]]
b = np.array([1, 0, 0, 0])
sol = np.linalg.solve(A, b)
print(sol)

# solve 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(-1, 1, 25)
y = np.linspace(-1, 1, 25)
z = x**2 + y**2
ax = plt.axes(projection='3d')
ax.plot_surface(x, y, z)
ax.view_init(elev=30, azim=30)
plt.show()

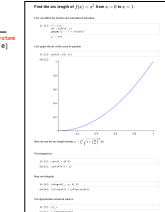
GNU Octave
# solve a square linear system
A = [ 2 3 0 -2 -4;
     -1 2 -1 0 1;
     0 0 0 0 0;
     0 0 0 0 0];
b = [ 1; 0; 0; 0];
[~, ~, ~] = lsqr(A, b);

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

# graph of a surface
[x, y, z] = meshgrid(linspace(-1, 1, 25),
                    linspace(-1, 1, 25),
                    zeros(25, 25));
surf(x, y, z);
view(30, 30);

```

SageMath Jupyter Interactive Notebook



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No graphing calculators, no license fees: free software for the mathematics classroom and beyond

Jason Lachniet

Abstract: With the cost of popular graphing calculators in excess of \$100 and software license fees for high-end software often even higher, there is as much potential for student savings by adopting free and open source software alternatives as there is with adoption of open source textbooks. It is now possible to do anything a graphing calculator can do (and much more) using free software, and in many fields, knowledge of the relevant software alternatives has more long term value for students than intimate knowledge of the buttons and menus of a particular calculator. Several free programs now rival even the dominant commercial software options like Maple, Mathematica, MATLAB, or SPSS.

High quality free software options exist across the spectrum from basic quantitative and statistical literacy through calculus, linear algebra, and beyond. This poster will provide a survey of several free software options for the mathematics classroom and relevant open source materials available to support implementation, and will also highlight current limitations and needs for additional resources.

Keywords: free software; scientific computing; statistics; computer algebra; graphing

A Discussion on the Use of Open Educational Resources on Campus

Sarah Donnelly, Britton Hipple,
Leanna Ireland, and Darren Maczka

Introduction

The Open Educational Resources (OER) movement has grown steadily over the past decade with more institutions supporting teaching and learning resources for higher education.¹ However, the adoption of OER into curriculum development and course preparation has been slow due to many perceived barriers that are common to instructors and faculty.¹ One such barrier to adoption surrounds the reusing of existing material developed for context in another. This reuse depends on relevancy, accessibility, and open-sourced permission for remixing.² OERs can decrease the barriers for students and support faculty using a transdisciplinary pedagogy. However, no repository currently available allows for easy remixing of content while preserving authorship history. Existing repositories of open access educational resources (e.g. OER Commons, Open Michigan, MERLOT) only promote the sharing and reuse of materials.³



References

1. Belikov, O. & Bodily, R. (2016). Incentives and barriers to OER adoption: A qualitative analysis of faculty perceptions. *Open Praxis*, 8(3), 235-246.
2. Abeywardena, I. S. (2012). The re-use and adaptation of open educational: Resources (OER). *An Exploration of Technologies Availables. Commonwealth of Learning*.
3. Shumaili, E. (2017). MERLOT - A reliable framework for OER. *IEEE Xplore*. Paper presented at the 2017 IEEE 41st Annual Computer Software and Applications Conference (COMPSAC), Turin, 697-699, IEEE.

Benefits:

Barriers:

What is PrepLab?

The team is in the early stages of creating an OER repository, called PrepLab, at Virginia Tech for graduate student instructors and early career faculty. The goal of developing PrepLab is to provide a space for instructors to creatively engage with the practice of teaching by using, adapting, and remixing openly available resources. PrepLab is taking a social approach to OERs to not only allow the sharing and reuse of content, but also create a community to share the context for effective use of that content.

Themes

At the 2019 CHEP at VT, a facilitated discussion called “Barriers to the Adoption of OERs in Teaching” was held. Themes gleaned from that discussion are summarized below.



This project is supported by:



A Discussion on the Use of Open Educational Resources on Campus

Britton Hipple, Darren Maczka, Sarah Donnelly, and Leanna Ireland

Abstract: The Open Educational Resource (OER) movement has grown steadily over the past decade with more institutions supporting teaching and learning resources for higher education. Literature cites cost savings, increased access, versatility, social justice, increased support, and collaborative networking. Despite these many benefits, the adoption of OER into curriculum development and course preparation has been slow. We led a facilitated discussion session at the 11th Annual Conference on Higher Education Pedagogy in 2019 on this topic to inform the development of a new OER repository at Virginia Tech, called PrepLab. Here, we summarize information gleaned from that discussion for why instructors do or do not use OERs in their classes. The conversation on the benefits and barriers unique to OERs can continue through this interactive poster.

Keywords: barriers; OER; benefits; interactive