

The OER Starter Kit

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Iowa State University Digital Press

Ames, Iowa



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Version 1.1. Revised September 5th, 2019. Citation style updated and additional references added throughout the volume.

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Suggested citation: Elder, A.K. (2019). *The OER Starter Kit*. Ames, IA: Iowa State University Digital Press. DOI: <https://doi.org/10.31274/isudp.7>

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Published by the Iowa State University Digital Press, a division of the University Library at Iowa State University.

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- Tools & Techniques for Creating OER

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- Accessibility & Usability
- Evaluating OER

Preface



This starter kit has been designed to equip instructors with the skills they need to confidently find, use, or even create open educational resources (OER). To do this, the book has been broken up into five major sections covering important aspects of working with OER:

- Getting Started
- Copyright
- Finding OER
- Teaching with OER
- Creating OER

In each chapter, learning objectives are provided to explain what the reader will learn and, in many cases, interactive exercises and examples are available as well.

GETTING STARTED

INTRODUCTION TO OPEN EDUCATIONAL RESOURCES

Learning Objectives

By the end of this chapter, you will be able to:

- Provide a definition of open educational resources.
- Explain the difference between OER and other free educational materials.
- Describe the challenges and benefits of using OER in a class.

The purpose of this handbook is to get you involved in the adoption, creation, and use of **open educational resources** (OER). In this chapter, we will introduce you to the concept of OER and the benefits and challenges of using them.

Background

The open education movement was originally inspired by the open source community, with a focus on broadening access to information through the use of free, open content. As Bliss and Smith explain in their breakdown of the history of open education:

“much of our attention focused on OER’s usefulness at providing knowledge in its original form to those who otherwise might not have access. The implicit goal was to equalize access to disadvantaged and advantaged peoples of the world – in MIT’s language, to create ‘a shared intellectual Common.’”¹

Following the rise of open education in the early 2000s, growing interest in MOOCs, open courseware, and particularly open textbooks catapulted the movement to new heights; however, there are still many instructors who have never heard of open educational resources (OER) today.²

What is an OER?

Open educational resources (OER) are openly-licensed, freely available educational materials that can be modified and redistributed by users. They can include any type of educational resource, from syllabi to full courses.

- **Openly-licensed:** You can read about this more in the [Copyright & Licensing](#) chapter.
- **Freely Available:** The resources must be freely available online with no fee to access. Physical OER

1. Bliss, T.J. and Smith, M. "A Brief History of Open Educational Resources." In *Open: The Philosophy and Practices that are Revolutionizing Education and Science*, edited by Rajiv Jhangiani and Robert Biswas-Diener, 9-27. London: Ubiquity Press, 2017. DOI: <https://doi.org/10.5334/bbc.b>.

2. Weller, Martin. *The Battle for Open: How Openness Won and Why it Doesn't Feel Like Victory*. London: Ubiquity Press, 2014. DOI: <https://doi.org/10.5334/bam>

may be sold at a low cost to facilitate printing.

- **Modifiable:** The resource must be made available under an open license that allows for editing. Ideally, it should also be available in an editable format.³

The most comprehensive definition of OER available today is provided by the Hewlett Foundation:

“Open Educational Resources are teaching, learning and research materials in any medium – digital or otherwise – that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions.”⁴

With a definition so broad that it includes any educational material so long as it is free to access and open, it might be easier to ask, “What isn’t an OER?”

What is Not an OER?

If a resource is not free or openly licensed, it cannot be described as an OER. For example, most materials accessed through your library’s subscriptions cannot be altered, remixed, or redistributed. These materials require special permission to use and therefore cannot be considered “open.” **Table 1** below explains the difference between OER and other resources often misattributed as OER.

Table 1: Components of an OER

Material Type	Openly Licensed	Freely Available	Modifiable
Open educational resources	Yes	Yes	Yes
Free online resources under all rights reserved copyright	No	Yes	No
Materials available through the University Library	No	Yes	No
Open access articles and monographs	Yes	Yes	Maybe

Note: Although some materials are free to access for a library’s users, that does not mean that they are free to access for everyone (including the library). Similarly, while some open access resources are made available under a copyright license that enables modification, this is not always the case.

Check Your Understanding

Consider the free materials you currently use in your classes. Do these materials meet the definition of OER? Why or why not?

3. Although all OER are openly licensed, many are released in formats that do not easily allow for adaptation.

4. William & Flora Hewlett Foundation. "Open Educational Resources." Accessed June 15, 2019. <https://hewlett.org/strategy/open-educational-resources/>

Benefits of Using OER

Benefits for Students

One of the first aspects of OER to be praised by the general public was the cost savings that they could bring to students. As **Figure 1** shows, the price of college textbooks has risen greatly over the past 35 years, outpacing all other consumer goods in the Consumer Price Index by a great margin.

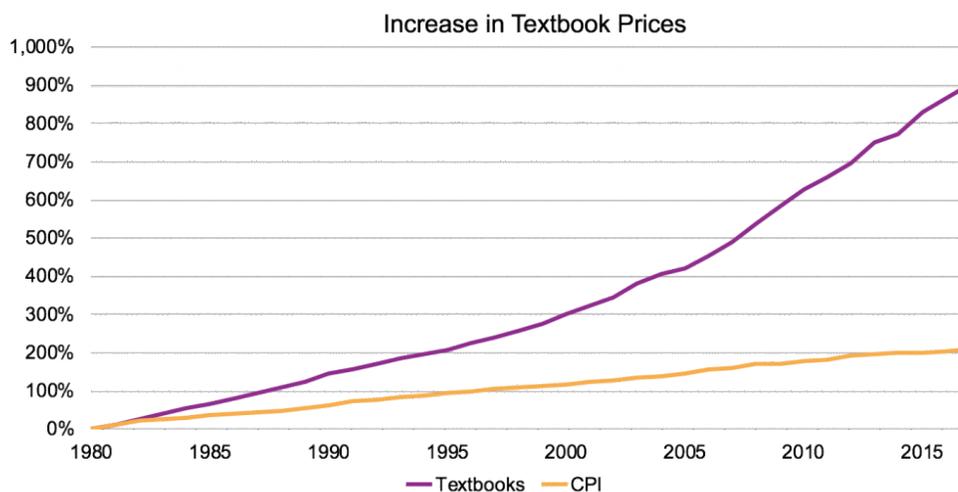


Figure 1: "Increase in Textbook Prices" by [David Ernst](#), the Open Textbook Network, is licensed [CC BY 4.0](#).
Data source: [Bureau of Labor Statistics](#).

The cost of textbooks has a profound impact on college students, many of whom must wait to purchase their course materials until well into the semester or choose not to purchase them at all.⁵

The cost of textbooks might not be a major issue on its own, but it can be an insurmountable hurdle for students already struggling to get by. As a recent survey found, 36% of college students are food insecure. This number is even higher for community college students, 42% of whom reported food insecurity.⁶

The problem of food and housing insecurity among college students cannot be fixed by adjusting the price of textbooks alone. There are a wide variety of reasons why these problems are in place.⁷ However, the unexpected additional cost of textbooks can make the difference between a student persisting in college or dropping out.

Access to a Quality Education

When you choose to share course materials openly, you are providing students with the opportunity to

5. Florida Virtual Campus. *2018 Student Textbook and Course Materials Survey: Executive Summary*, 2018. Accessed June 15, 2019. https://www.flbog.edu/documents_meetings/0290_1174_8926_6.3.2%2003a_FLVC_SurveyEXSUM.pdf

6. Romo, Vanessa. "Hunger and Homelessness are Widespread Among College Students, Survey Finds." *NPR: The Two-Way*, April 2018. <https://www.npr.org/sections/thetwo-way/2018/04/03/599197919/hunger-and-homelessness-are-widespread-among-college-students-study-finds>

7. Goldrick-Rab, Sara and Cady, Clare. *Supporting Community College Completion with a Culture of Caring: A Case Study of Amarillo College*, 2018. <https://hope4college.com/supporting-community-college-completion-with-a-culture-of-caring-a-case-study-of-amarillo-college/>

engage with your content before, during, and after your course. Because OER are always free to access online, students who are interested in taking a course you teach can read up on the course ahead of time and ensure that they are ready and interested in the material. Moreover, students who have already taken your course can be safe in the knowledge that their course materials will not evaporate at the end of the semester and that they can continue to review the materials you provided to them for years to come.

The students who benefit from access to OER are not just the ones in your classroom. Unlike affordability initiatives like course reserves, OER are free for anyone in the world to access, whether they have a college affiliation or not.⁸ This encourages aging learners and students in the Global South to explore educational content without having to commit the time and money they might not have to attend college.⁹

Benefits for Instructors

Although cost savings are a major talking point in favor of adopting open educational resources, instructors can utilize OER effectively without replacing paid resources at all.¹⁰ In fact, the freedom to adapt OER to instructional needs is often the most attractive aspect of OER. Since OER are openly licensed, educators are free to edit, reorder, and remix OER materials in many ways.

Use, Improve, and Share

- Adapt and revise resources that have already been created to fit your course syllabus.
- Create an updated second edition of an existing OER.
- Tailor resources to fit your specific course context (e.g., translation, local examples).

Network and Collaborate with Peers

- Access educational resources that have been peer-reviewed by experts in your field.
- Create a new open educational resource with a team of your peers.
- Explore user reviews for a more in-depth understanding of the resources available.

Lower Costs to Improve Access to Information

- Enable all students to have equal access to your course materials.
- Provide students with the opportunity to explore course content before enrolling.

8. Although OER are free for anyone to access, this access is still limited by who has access to the Internet. Still, since OER can be freely redistributed, some individuals have printed OER for dissemination in areas that do not have Internet access as well.

9. Hodgkinson-Williams, Cheryl and Arinto, Patricia B. *Adoption and Impact of OER in the Global South*. Cape Town & Ottawa: African Minds, International Development Research Centre & Research on Open Educational Resources, 2017. DOI: 10.5281/zenodo.1005330

10. **Attribution:** The Benefits for Instructors section of this chapter was adapted from the [SUNY OER Community Course](#), licensed [CC BY 4.0](#).

Challenges of Using OER

There are many benefits to using OER in the classroom; however, there are also some drawbacks. The biggest challenge that instructors face when adopting OER is best encapsulated by the phrase “availability may vary.”

Subject Availability

Many of the largest OER projects funded over the past fifteen years targeted high cost, high impact courses to save students money. Because of this, most of the OER available today are for general education courses such as Psychology, Biology, and Calculus.

This does not mean that there are no OER available for specialized subject areas or graduate-level courses; however, there are more resources to choose from for instructors who teach *Introduction to Psychology* than for those who teach *Electronic Systems Integration for Agricultural Machinery & Production Systems*.

Note: This is beginning to change as more institutions begin publishing OER through regional and institutional grant programs.

Format & Material Type Availability

As with subject availability, the format and types of OER that have been developed over time have largely been targeted at high enrollment courses which could see substantial cost savings for students. There are many open textbooks available today, but fewer options for ancillary materials. You can find lecture slides, notes, and lesson plans online, but ancillary content such as homework software and test banks are harder to find.¹¹

Time & Support Availability

Although the other challenges to OER use are inherent to the resources themselves, this final drawback is a concern for you as a user and creator. It takes time and effort to find OER that might work for your course, and if you want to create and publish new resources, that takes exponentially more time.

Time constraints are always going to be an issue for instructors who want to try something new in their course. Luckily, there are resources available to help you locate, adopt, and implement OER. Contact your local OER expert on campus or your subject librarian if you need support.

This chapter has provided a brief overview of what OER are, why they are used, and the movement surrounding them. In the next chapter, we will review some items you should keep in mind when adopting or creating an OER for the first time.

11. Open textbooks have not always been the most common content shared or marketed as OER. One of the first OER projects, MIT OpenCourseWare, started offering lecture notes, syllabi, and other instructional content openly in 2001.



An interactive H5P element has been excluded from this version of the text. You can view it online here:
<https://iastate.pressbooks.pub/oerstarterkit/?p=802#h5p-3>

CONSIDERATIONS FOR USING OR CREATING OER

Learning Objectives

By the end of this chapter, you will be able to:

- Assess your teaching materials for the potential to release as OER.
- List 3 key considerations to keep in mind before adopting an OER.

Transforming your course to include OER can be as simple as switching one material for another or as radical as completely changing your teaching style. This chapter outlines some key considerations and questions you should ask yourself before adopting or creating OER.¹

How will using OER improve your course?

When integrating OER into your course, you have the opportunity to critically evaluate your methods and alter them to better meet your needs. One way to go about this is to use backward design for your project.

Backward design is a framework for planning your course around its intended outcomes.² There are three stages to the backward design process:

1. Identify desired results,
2. Determine acceptable evidence, and
3. Plan learning experiences and instruction.³

You might notice that this approach does not end with “create and/or curate educational content.” Instead, it ends with more planning. The purpose of backward design is not to be done with your course transformation in a quick 3-step process. Instead, it asks instructors to question the processes and materials they currently use and to start over by plotting out what is needed to meet your course outcomes.

Considerations

1. **Attribution:** This chapter was adapted from "Considerations before using or creating an OER" from [The ABOER Starter Kit](#), by Technologies in Education at the Faculty of Education, the University of Alberta, available under a [Creative Commons Attribution 4.0 International License](#).
2. AvenuesdotOrg. "Grant Wiggins - Understanding by Design, Part 1." Youtube video, 10:51. February 28, 2013. <https://www.youtube.com/watch?v=4isSHf3SBuQ>
3. Wiggins, Grant and McTighe, Jay. *Understanding by Design*. Alexandria: Association for Supervision and Curriculum Development, 2005.

- What do I want my students to learn?
- How will I communicate to students that the concepts I present are valuable?
- How will I assess my students' understanding of core concepts? (See our [Assessing Course Outcomes chapter](#) for help)

Thinking critically about the purpose of your course and the learning outcomes you want your students to meet is one way to ensure that you provide an excellent learning experience for your students.

Who is your audience?

Once you've decided that you're ready to use OER in your course, it's important to consider your target audience(s).

Considerations

- Do you have a primary audience? For example, majors or non-majors.
- Does your audience belong to a specific geographic location or ethnicity?
- Are there cultural differences you need to consider before creating your OER? (See our [Diversity & Inclusion chapter](#) for help)

Although your OER may be used by educators around the world, you can create it with your local audience in mind. One of the great things about open licenses is that it grants users the right to adapt your work. Because of this, educators in other countries can translate your OER into their native language or add examples relevant to their cultural context.

Does the OER you need already exist?

It is generally a good idea to look around at what content is available for your course before creating something new. There are two reasons for this:

1. The OER you want to create/use may already exist in the format you want.
2. Your own teaching materials could be adapted for use as OER. For example, lecture notes can be an invaluable teaching aid for courses with no excellent textbooks available.

Considerations

- What changes would you need to make to share your own content as an OER?
- What types and formats of OER are you looking for?
- Where should you begin your search? (See the [Finding Open Content chapter](#) for help)

How will you disseminate your course OER?

Whether you are using an OER as-is or creating something from scratch, one of the first considerations you should take into account is how you will share the resource(s).

Considerations

- Will you host created OER in an institutional repository or a third-party platform?
- How will you make evident when you (or other creators) post updates to the content?
- During your class, how will students access the OER?

What expertise is required to use or create OER?

Creating an OER can be a considerable amount of work, especially if you're starting from scratch. It's important to consider all aspects for your project including instructional design, technology, and graphics before you jump in.

Considerations

- What aspects of the project are you most and least comfortable with?
- What support is available at your university to help you structure, develop, and disseminate your project?
- Is there support available to make your OER accessible in multiple formats?

Integrating an existing OER into your curriculum doesn't need to be a one-man job. Instructional designers and librarians can provide guidance to help you incorporate open resources into your course. At Iowa State University, you can get support creating OER from the [ISU Digital Press](#). At other universities, you may have more or less support available. Please reach out to your library or another office on campus that manages OER support to learn more.

Could your OER be easily reused or repurposed?

One of the primary benefits of OER is that they are reusable. When adopting an existing OER, you'll want to choose one that isn't so specific that it can't be adapted to your needs. Similarly, if you create your own OER, making it easy to adapt will broaden its use among other instructors.

Considerations

- In what formats could you make your OER available? (See our [Tools & Techniques for Creating OER chapter](#) for help)
- What formats are you used to working with for your own work?
- Is your chosen OER designed in such a way that you can pick and choose what content to use?

This chapter outlined some considerations to keep in mind when transforming your course to use OER. One aspect of OER not covered here, however, is how to make an OER “open” and what that means. To answer that question, in the next chapter we'll discuss the role that copyright plays in an OER's development and dissemination.

COPYRIGHT

COPYRIGHT AND OPEN LICENSING

Learning Objectives

By the end of this section, you will be able to:

- Define copyright and open licenses.
- Explain the purpose of copyright law in the United States.

An **open license** is a vital component of an open educational resource. Because of this, it is important that you understand how open licenses work within copyright law. This chapter will provide an overview of U.S. copyright law, fair use, and licensing to help you navigate this topic.

Copyright Law

U.S. copyright law protects an author's rights over their original creative works (e.g., research articles, books and manuscripts, artwork, video and audio recordings, musical compositions, architectural designs, video games, and unpublished creative works).¹ As soon as something is "fixed in a tangible medium of expression," it is automatically protected by copyright. A resource is considered fixed when:

"its embodiment ...by or under the authority of the author, is sufficiently permanent or stable to permit it to be perceived, reproduced, or otherwise communicated for a period of more than transitory duration."²

In other words, an idea for a book you want to write is not protected by copyright, but the first draft of your manuscript is. Copyright protection ensures that the creator of a work has complete control over how their work is reproduced, distributed, performed, displayed, and adapted.³ You do not need to register your resource with the U.S. Copyright Office for this to come into effect; it is automatic.

Public Domain

Works that are no longer protected by copyright are considered part of the public domain. Items in the public domain can be reused freely for any purpose by anyone, without giving attribution to the author or creator.⁴

Public domain works in the U.S. include works whose creator died 70 years prior, works published before 1924, or works dedicated to the public domain by their rightsholder. The Creative Commons

1. Copyright Law of the United States, 17 USC §102. <https://www.copyright.gov/title17/92chap1.html#102>

2. Copyright Law of the United States, 17 USC §101. <https://www.copyright.gov/title17/92chap1.html#101>

3. Copyright Law of the United States, 17 USC §106. <https://www.copyright.gov/title17/92chap1.html#106>

4. Of course, standard citation procedures still apply for creative works in the public domain. You cannot claim another's work as your own.

organization created a legal tool called CC 0 to help creators dedicate their work to the public domain by releasing all rights to it.⁵

Licensing

The copyright status of a work determines what you can and cannot do with it.⁶ As you begin to explore OER for use in your classroom, it is important that you understand your rights over the works you create and what it means to give those rights away.

Most copyrighted works are under full, “all rights reserved” copyright. This means that they cannot be reused in any way without permission from the work’s rightsholder (usually the creator). One way you can get permission to use someone else’s work is through a **license**, a statement or contract that allows you to perform, display, reproduce, or adapt a copyrighted work in the circumstances specified within the license. For example, the copyright holder for a popular book might sign a license to provide a movie studio with one-time rights to use their characters in a film.

What About Fair Use?

If an OER is available under a copyright license that restricts certain (re)uses, you can make a fair use assessment for reproducing or adapting that work. However, having explicit permission is preferable. **We do not** recommend using fully copyrighted works in OER projects without written permission from the work’s rightsholder.

Open Licenses

All OER are made available under some type of **open license**, a set of authorized permissions from the rightsholder of a work for any and all users. The most popular of these licenses are **Creative Commons** (CC) licenses, customizable copyright licenses that allow others to reuse, adapt, and re-publish content with few or no restrictions. CC licenses allow creators to explain in plain language how their works can be used by others.⁷

Creative Commons licenses will be explored in more detail in the next chapter. However, there are other open licenses that can be applied to educational materials. A few of these licenses are described below:

- **GNU Free Documentation License:** a copyleft license that grants the right to copy, redistribute, and modify a resource. It requires all copies and derivatives to be available under the same license. Copies may be sold commercially, but the original document or source code must be made

5. Peters, Diane. "Improving Access to the Public Domain: The Public Domain Mark." *Creative Commons Blog*, October 11, 2010. <https://creativecommons.org/2010/10/11/improving-access-to-the-public-domain-the-public-domain-mark/>

6. **Attribution:** "Licensing" and "Public Domain" were adapted in part from [UH OER Training](#) by Billy Meinke, licensed [CC BY 4.0](#).

7. By assigning an open license to your work, you allow any user to exercise the rights allowed under the license, and cannot restrict reuse by certain individuals or parties without changing the license itself.

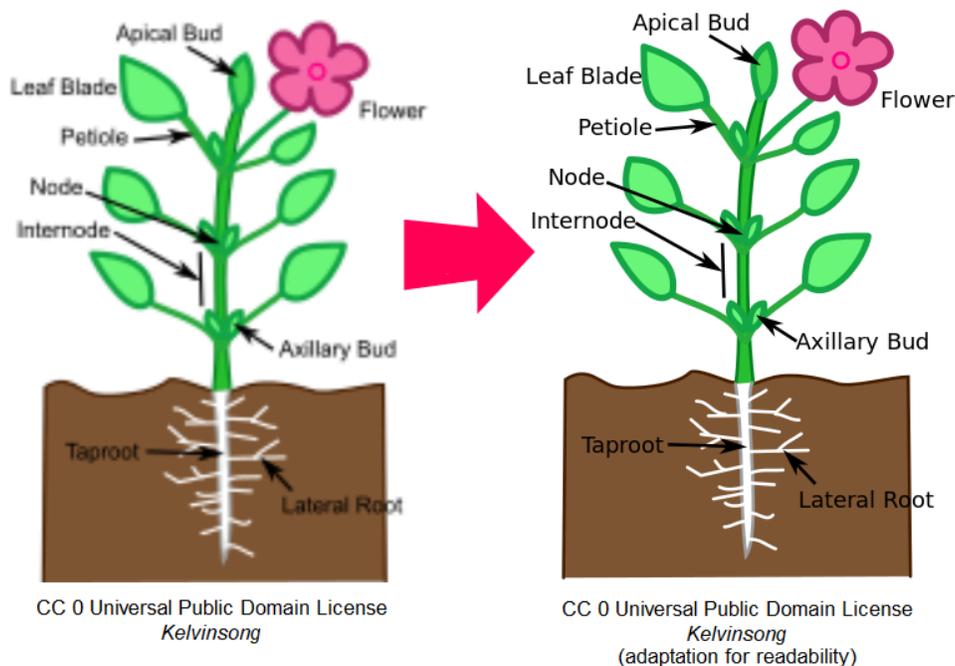
available to the user as well.⁸

- **Free Art License:** The FAL “grants the right to freely copy, distribute, and transform creative works without infringing the author’s rights.” It is meant to be applied to artistic works, not documents.⁹

If you’re interested in learning more about open licenses, feel free to explore the Free Software Foundation’s information on copyleft licenses, some of the first licenses used for open content.¹⁰

Why Open Licenses?

Open licenses are an integral part of what makes an educational resource an OER. The adaptability and reusability of OER make it so that they are not just free to access, but also free for instructors who want to alter the materials for use in their course. For example, in the figure below an openly licensed image has been traced to make it more readable for users.



“Adaptation in action” by Abbey Elder, licensed [CC 0 1.0](https://creativecommons.org/licenses/by/4.0/), was adapted from “[Copyrighted source to tracing](#)” by Kelvinsong, also licensed [CC 0 1.0](https://creativecommons.org/licenses/by/4.0/). This image was originally used to represent an improper recreation of a copyrighted work via tracing. In this example, it shows how an already open work can be legally recreated via tracing for readability.

One of the tenets of OER laid out early on in the open education movement was the idea of the 5 Rs (originally the 4 Rs) introduced by David Wiley.¹¹ These five attributes lay out what it means for something to be truly “open,” as the term is used in open education. The 5 Rs include:

8. Free Software Foundation. “GNU Free Documentation License.” 2008. <https://www.gnu.org/licenses/fdl.html>

9. Copyleft Attitude. “Free Art License 1.3.” 2007. <http://artlibre.org/licence/lal/en/>

10. Free Software Foundation. “What is Copyleft?.” Accessed June 29, 2019. <https://www.gnu.org/copyleft/copyleft.html>

11. Wiley, David. “Defining the ‘Open’ in Open Content and Open Educational Resources.” *Open Content blog*, 2014. <http://opencontent.org/definition/>

- **Retain** = the right to make, own, and control copies of the content.
- **Reuse** = the right to use the content in a wide range of ways
- **Revise** = the right to adapt, adjust, modify, or alter the content itself
- **Remix** = the right to combine the original or revised content with other open content to create something new
- **Redistribute** = the right to share copies of the original content, your revisions, or your remixes with others

While the “redistribute” and “revise” rights are the most commonly exercised rights in open education, each of the five plays an important role in the utility of an open educational resource. For example, without the right to “remix” materials, an instructor who teaches an interdisciplinary course would not be able to combine two disparate OER into a new resource that more closely fits their needs.

In the next chapter, we’ll look at Creative Commons licenses and how they facilitate the expression of the 5 Rs in unique ways.



An interactive H5P element has been excluded from this version of the text. You can view it online here:
<https://iastate.pressbooks.pub/oerstarterkit/?p=804#h5p-6>

CREATIVE COMMONS LICENSES

Learning Objectives

By the end of this section, you will be able to:

- Describe the four different Creative Commons License components.
- Explain why some CC-licensed content might not be considered OER.

As we mentioned in the previous chapter, **Creative Commons** (CC) licenses allow you to explain, in plain language, how your creative works can be reused. These licenses act as explicit, standing permissions for all users.¹

The Four Components of Creative Commons Licenses



Attribution (BY) Proper attribution must be given to the original creator of the work whenever a portion of their work is reused or adapted. This includes a link to the original work, information about the author, and information about the original work's license.



Share-Alike (SA) Iterations of the original work must be made available under the same license terms.



Non-Commercial (NC) The work cannot be sold at a profit or used for commercial means such as for-profit advertising. Copies of the work can be purchased in print and given away or sold at cost.



No Derivatives (ND) The work cannot be altered or “remixed.” Only identical copies of the work can be redistributed without additional permission from the creator.

These elements can be mixed and matched to create a total of **six Creative Commons licenses**.²

Choosing a License

Choosing a CC license can be confusing at first, but the [online Choose a License tool](#) can help. This tool generates a license based on which rights you want to retain and which you would like to give to users. For example, if you want to share your work and allow others to adapt it, but you do not want others to be able to sell your work, you might consider using the CC BY NC license.

Before you choose a license, keep in mind that an OER should be able to exercise all the 5 Rs of open content we discussed in the previous chapter. Not all of the CC licenses meet this definition. Specifically, the CC BY ND and CC BY NC ND licenses do not allow revising or remixing content, two of the most significant freedoms of OER for many instructors.

1. **Attribution:** This chapter was adapted from [The ABOER Starter Kit](#) by Technologies in Education at the Faculty of Education, the University of Alberta, available under a [Creative Commons Attribution 4.0 International License](#).

2. Note that the No Derivatives and Share Alike components are incompatible and cannot be combined under one license.

Wiley's 5Rs and Creative Commons Licensing

	Retain	Reuse	Revise	Remix	Redistribute	
	Make and own a copy	Use in a wide range of ways	Adapt, modify, and improve	Combine two or more	Share with others	
Public Domain	✓	✓	✓	✓	✓	↑ OER ↓ ↑ Not OER ↓
CC-BY	✓	✓	✓	✓	✓	
CC-BY-SA	✓	✓	same license	same license	✓	
CC-BY-NC	✓	✓	✓	✓	non-commercial	
CC-BY-NC-SA	✓	✓	same license	same license	non-commercial	
CC-BY-ND	✓	✓	personal use only	personal use only	✓	
CC-BY-NC-ND	✓	✓	personal use only	personal use only	non-commercial	

Attribution: "Wileys 5Rs and Creative Commons Licensing" is by Krysta McNutt, [CC-BY 4.0](#). To view the full version, [visit the Google Drawing](#).

Implementing a CC License

Creative Commons has an [online Marking Guide](#) that demonstrates how to mark your CC license on different types of media. Making your license obvious on whatever item you are sharing is an important part of the dissemination process for OER: otherwise, users won't know what license you've chosen! No matter the format, there are some standards you can follow:

- Make it clear
- Make it visible
- Provide links (to the license and the work)

The Four "Open" CC Licenses

There are strengths and weaknesses to each Creative Commons license you might apply to your OER. To help you make an informed decision, a short description of each license that can be applied to OER is provided below.



CC BY

Strengths

- The CC BY license is the most popular and open license provided by Creative Commons.

- By requiring attribution and nothing else, your CC BY work will be easy for others to adapt and build upon.
- CC BY is often the default choice for open publications. Youtube uses the CC BY 3.0 license as their single “Creative Commons” option.

Weaknesses

- Because CC BY allows for easier sharing and adaptation, it also leaves the creator with less power over their work. When you use a CC BY license, you cannot be certain that your work will remain open or that your work will be reused for projects you support.



Strengths

- The CC BY SA combines the openness of CC BY license with the caveat that an item remains open under the same license when adapted.
- The CC BY SA license is the second most popular license, and the license used by Wikipedia for their articles.

Weaknesses

- Because the CC BY SA license requires that adapted content be shared under the same license, it can be difficult to adapt or to remix works licensed CC BY SA.³



Strengths

- The CC BY NC license gives the creator of a work complete control over any commercial reuse of their work.
- As a user, you can adapt and remix CC BY NC works so long as your new works provide attribution to the original author and do not turn a profit.

Weaknesses

- Some users may be concerned about what they are allowed to do with your CC BY NC work and

3. TheOGRpository. "Creating OER and Combining Licenses." YouTube video, 9:16. September 5, 2012. <https://www.youtube.com/watch?v=Hkz4q2yuQU8>

where the commercial “line” is drawn. This topic is addressed in more depth in our [OER in Print chapter](#).



Strengths

- CC BY NC SA is the most restrictive license that can be used for OER and gives you the most control over its adaptations.
- Some creators apply this license out of concern for their works being “scooped” by commercial publishers.

Weaknesses

- Because of its requirements, the CC BY NC SA license is the hardest to adapt, remix, or build upon.
- If you hope to leverage the open community to promote and share your content, this license may be a deterrent for potential partners.

You can learn more about the individual CC licenses on [the Creative Commons website](#).

If you want to reuse an existing OER, there are some aspects of CC licenses you should keep in mind. Although there are different rules for each, every CC license includes the Attribution component which requires that users provide proper attribution for an original work being shared or adapted.

Attribution vs Citation

Attribution is a similar process to citing academic works in a paper, but there are some key differences. The following table outlines some of the ways in which citations and attribution are similar and different:

Attribution: This table was adapted by Abbey Elder from “[Citation vs. Attribution](#)” by Lauri Aesoph, licensed [CC BY 4.0](#).

Citation	Attribution
Purpose is academic (e.g. avoiding plagiarism)	Purpose is legal (e.g. following licensing regulations)
Does NOT typically include licensing information for the work	Typically includes licensing information for the work
Used to quote or paraphrase a limited portion of a work	Used to quote or paraphrase all or a portion of a work
Can paraphrase, but cannot typically change the work's meaning	Can change the work under Fair Use or with advance permission (e.g., under most CC licenses)
Many citation styles are available (e.g., APA, Chicago, and MLA)	Attribution statement styles are still emerging, but there are some defined best practices
Cited resources are typically placed in a reference list	Attribution statements are typically found near the work used (e.g., below an image)

In this chapter, we have discussed how Creative Commons licenses work and how you can use these licenses for publishing or sharing open content. In the next chapter, we'll explore how you can find existing OER to use in your course.



An interactive H5P element has been excluded from this version of the text. You can view it online here:
<https://iastate.pressbooks.pub/oerstarterkit/?p=199#h5p-5>

FINDING OER

EVALUATING OER

Learning Objectives

At the end of this chapter, you should be able to:

- Describe three aspects of an OER that should be assessed before use.
- Explain why it is necessary to assess an OER's adaptability.

You should always evaluate the resources you implement in your classroom, no matter where they come from. Some of the evaluation criteria listed below are universal, and others (such as Adaptability and Modularity) are specific to OER.¹

Clarity, Comprehensibility, and Readability

The most ubiquitous standard on this list is also the first: can the material you are considering be read and understood by your students? Although it might seem like a simple question, it is a necessary obstacle to confront when adopting a new resource for your course.

Considerations

- Is the content, including any instructions and exercises, clear and comprehensible to students?
- Is the content consistent with its language and formatting? (e.g. key terms are bold)
- Is the content well-organized in terms of sequencing and flow?

Content and Technical Accuracy

The accuracy of the content you use is also a major component of its usability in the classroom. Be sure to check for technical errors such as broken links or typos. In most cases, content accuracy will not be an issue, but some older resources may require updates.

Considerations

1. **Attribution:** These criteria are from the Affordable Learning Georgia "[Selecting Textbooks](#)" webpage have been used with permission from the creator.

- Is the content accurate based on your expertise?
- Are there any factual, grammatical, or typographical errors?
- Is the interface navigable for students?

Adaptability and Modularity

Because of their open licenses, OER permit a wider range of (re)use than most traditional educational content; therefore, it is important to keep in mind how your chosen OER can be adapted. Modularity, or the ability to be broken up into smaller pieces easily, is one feature of an OER that should be preferred when possible. When creating OER, using clear chapter and unit breaks can help other instructors adopting or adapting your resource for their own courses.

Considerations

- Is the resource in a file format which allows for adaptations, modifications, rearrangements, and updates?
- Is the resource easily divided into modules, or sections, which can be used or rearranged out of their original order?
- Is the content available under a license which allows for modifications?

Appropriateness and Fit

Although there may be OER available in your field, some resources may require minor edits or additions. Keep in mind that the open licenses of OER mean that they can be edited or even combined with other resources. This can be particularly useful if you would like to adopt a chapter from one OER for the first unit of your course but prefer alternate resources for other units.

Considerations

- Is the content presented at a reading level appropriate for your students?
- How does the content align with your course learning objectives?
- Is the content level appropriate for use in your course?

Accessibility

No matter what resources you plan to adopt, accessibility should always be a part of your assessment process. Many published-provided homework products are not accessible to students and can cause unexpected issues. Similarly, some OER may not be optimized for students with visual or auditory impairments. See our [Accessibility & Usability chapter](#) for more details.

Considerations

- Is the content accessible to students with disabilities through the compatibility of third-party reading applications?
- If you are using Web resources, does each image have alt text that can be read? Do videos have accurate closed-captioning?
- Are students able to access the materials in a quick, non-restrictive manner?

If you would like a personal copy of these considerations, visit or download them through the [Evaluating OER Checklist in Google Docs](#).

This chapter covers content assessment, or how an instructor can assess OER for quality and fit in their class. For a better understanding of assessing course outcomes from using OER, see our [Assessing Course Outcomes chapter](#).

FINDING OPEN CONTENT

Learning Objectives

By the end of this section, you will be able to:

- Demonstrate how to conduct a preliminary search for open educational resources.
- List three resources that can be used for finding OER.

There are many different places used to host OER, from institutional repositories to grant-funded websites. Consequently, not all OER are easy to find. In this chapter, we will review some methods you can use to locate OER for your course.

The Search Process

There are four easy steps any instructor can take when looking for open content:

1. Identify keywords related to your course and its learning objectives.
2. Search OER repositories and aggregators for any relevant resources.
3. Review the resources you've located for fit, currency, accessibility, and any other rubric you deem necessary when judging teaching materials.
4. Reflect on the materials you have located.

For a more guided approach through this process, download a copy of our [OER Treasure Hunt Worksheet in Google Docs](#).

Search Tips

Start Broad

Searching for OER can be difficult when you're starting from a narrow perspective. For the most results, start with a broad search focused on your discipline. Once you've brought together a large collection of resources, then you can begin to limit your results.

OER Search Scenario

Barbara teaches a course on abnormal psychology. She wants to find videos, readings, and case studies related to this topic for her course. Here is an example of a search strategy she can follow by starting broad:

1. Search the **Open Textbook Library** for “Psychology.” Peruse the Tables of Contents of listed textbooks to find chapters or sections focusing on topics covered in the course.
2. Search **OASIS** for “abnormal psychology.” Since OASIS searches content on multiple repositories, limiting your search a little more can be useful. These can then be sorted by format, type, or date.
3. Search **YouTube** for videos on specific topics related to Abnormal Psych. Since YouTube contains so many different types of content, being specific is more important on this platform.
4. As a last-ditch effort, do an **Advanced Search in Google** for “Abnormal Psychology” (we will discuss this more below).

By the end of these searches, Barbara has compiled the following list: [Abnormal Psychology OER List in Google Docs](#)

Check Your Understanding

Try out your own search using simple keywords. What did you find from your initial search? When did you decide to start narrowing your results? What’s missing?

Keep an Open Mind

You don't have to jump into a fully open course right away. Start small by adding OER lesson plans to your coursework, or wait and see what OER are published next semester. The number and breadth of OER available are changing every day. Although there might not be resources available for your course right now, that may not be the case next year or even next month. Including OER in your regular assessment of materials for use in your course is a great first step for finding resources you can adopt in the future.

Filter by Usage Rights in Google

Google is a familiar resource for many of us, and it is also useful for finding openly licensed content. The Advanced Search feature in Google allows you to filter results by **Usage rights**. Filtering by usage rights will limit your results to works with certain licenses listed on the webpage, usually Creative Commons licenses. There are a few options to choose from in the Usage Rights list, but we recommend starting with “free to use or share” to retrieve the broadest set of results.¹

1. Adding "OER" to your search terms can help you locate materials created for sharing if your Google search is retrieving too many results.

Then narrow your results by...

language:	any language
region:	any region
last update:	anytime
site or domain:	
terms appearing:	anywhere in the page
SafeSearch:	Show most relevant results
file type:	any format
usage rights:	not filtered by license

Advanced Search

Google Advanced Search interface screenshot

Remember when using this method that Google trusts what users tell it about an item’s copyright status. Although a resource may be labeled CC BY or even CC 0, you should trust your instincts if you aren’t sure whether the item you are reviewing is actually under copyright. Contact a librarian or a university lawyer if you have questions.

This chapter has provided a short overview of some tools and techniques you can use to find OER. In the next chapter, we’ll provide a more comprehensive list of search tools grouped by topic and type.

Getting Help

Reach out to your subject librarian or an OER expert near you if you need help finding OER. At Iowa State University, we can help by offering consultations to find what resource(s) might be right for you. Instructional designers can help as well. Although it can be difficult to find OER in some disciplines, keep in mind that OER can be adapted to fit your course if necessary; you don’t have to use every resource as-is.



An interactive H5P element has been excluded from this version of the text. You can view it online here: <https://iastate.pressbooks.pub/oerstarterkit/?p=806#h5p-10>

REPOSITORIES AND SEARCH TOOLS

Learning Objectives

By the end of this section, you will be able to:

- Identify four search tools for finding open educational resources.
- Identify at least two search tools for finding openly licensed media.

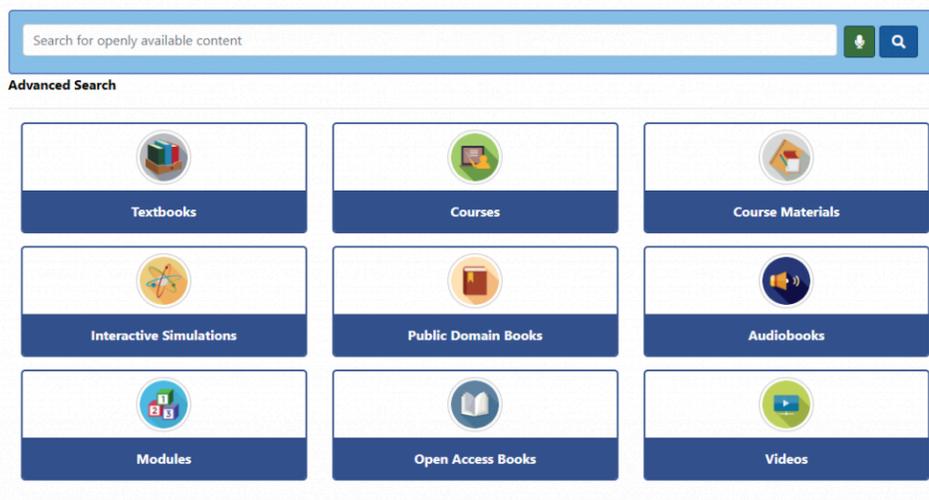
In the last chapter, we reviewed some strategies for finding OER. Below, a set of available repositories, search tools, and resources are listed to help you find the right OER for you.

Best Bets

When starting your search for OER, it's best to begin in a place with a wide variety of options. The websites listed below each have a different focus, but they are good places to start if you aren't sure what to look for.

- [The Open Textbook Library](#) is a great resource for finding open textbooks. If you want a textbook and nothing more, this is the place to start.
- [BCCampus Open Textbooks](#) collects resources created, reviewed, or adopted by instructors at British Columbia universities. Materials can be filtered by Accessibility as well as whether they have been adopted by BCCampus courses, include ancillary materials, or have been reviewed by faculty.
- Curated lists of OER, like [the Iowa State University Library Guide to OER](#), can be useful for exploring a selection of open content in your subject area.

Federated Search Tools



[SUNY's Openly Available Sources Integrated Search \(OASIS\)](#)

OASIS is a search tool that aims to make the discovery of open content easier by searching multiple sources for OER and other open content at once. OASIS currently searches for open content from 79 different sources and contains approximately 330,000 records.

[George Mason OER Metafinder](#)

The Mason OER Metafinder (MOM) links to a wide array of open content, including open access books and articles, documents in the public domain, and OER. Because of its large breadth of resources, we recommend that you start your MOM search with only a selection of the “OER-specific sites” checked, rather than all the materials it can include.

[MERLOT](#)

MERLOT is a project that was started in 1997 by the California State University system. The repository includes thousands of resources contributed by members, including original content and links to resources found through other platforms.

Institutional Collections

Institutional repositories (IRs) aren't just for sharing copies of research articles and student theses. They can also be used to store and share OER. Although not every college shares OER through their institutional repository, the colleges below do share collections of OER specific to their institution:

- [Galileo Open Learning Materials](#) (Georgia higher ed institutions)
- [OpenMichigan](#) (University of Michigan)
- [MIT OpenCourseWare](#) (Massachusetts Institute of Technology)

Subject-specific Repositories

Some open educational resources are shared through subject-specific repositories. A few notable examples of this type, including open publishers that specialize in one discipline, are listed below:

- [Chem Collective](#): *Chemistry*
- [Learn Chem E](#): *Chemical Engineering*
- [Noba Project Psychology Modules](#): *Psychology*
- [Center for Open Educational Resources and Language Learning \(COERLL\)](#): *Languages*
- [Open Geography Education](#): *Geography*
- [Engineering Technology Simulations](#): *Engineering, Physics*
- [PhET Simulations](#): *Physics, Physical science, Geology, Chemistry*
- [SkillsCommons](#): *Career & Technical Education (CTE)*
- [Green Tea Press Textbooks](#): *Computer Science, Programming (Bayes, Python, MATLAB, Java, DSP)*

OER by Course

Some colleges choose to share information about which OER their instructors assign in courses. These lists can give you a good idea of what other instructors in your discipline have adopted and (if they have provided a review), what they think of their adopted resource.

- [COOL4ED Faculty Showcase](#) (California universities and colleges)
- [Open Oregon Educational Resources](#) (Oregon universities and colleges)
- [OPEN NYS Faculty Assessments](#) (New York State universities)

Open Content (not explicitly OER)

Not all open content is made to be used in the classroom, but that doesn't mean you can't integrate them into your course. Open access book chapters and openly-licensed media can be great additions to your course.

Open Access Publishers and Repositories

- [Directory of Open Access Journals](#) (DOAJ): Open Access journal articles
- [Directory of Open Access Books](#) (DOAB): Open Access books
- [Project Gutenberg](#): Public domain books and documents
- [PubMed](#): Open access journal articles
- [Public Library of Science](#) (PLoS): Open access journal publisher

- [Open Book Publishers](#): Open access book publisher

CC-licensed Media

- [CC Search](#): A federated search tool for finding content available under a CC license
- [Digital Public Library of America](#): Public domain images, videos, recordings, and texts
- [The Metropolitan Museum of Art](#): High-quality open images from the Met
- [Pexels](#): Public domain and CC-licensed photographs and stock images
- [Unsplash](#): Public domain and CC-licensed photographs and stock images
- [Wikimedia Commons](#): Public domain and CC-licensed images and figures
- [Google Image Search](#): Images. Use the Tools/Usage rights button to filter by license
- [Youtube](#): Videos. Use the Advanced Search/CC license option to see open content
- [Free Music Archive](#): Public domain and CC-licensed music and sound bytes

ANCILLARY CONTENT

Learning Objectives

By the end of this chapter, you will be able to:

- List two providers of open ancillary content, such as assessment systems.
- Explain why some content providers charge for access to OER-adjacent content.

In our first chapter, we explained that ancillary OER are less common than other types of open content. There are many open ancillary resources available in simple file formats such as PDF lesson plans, PowerPoint presentations, and lecture notes, but interactive resources like those often included in publisher-provided content packages are less common. In this chapter, we will discuss the exceptions to that rule.

Open Ancillary Resources

[OpenStax Hub](#)

In 2017, one of the most popular open textbook publishers, OpenStax, teamed up with OER Commons, one of the most popular OER repositories. The OER Commons Hub is a venue for instructors to share ancillary materials that they have created to pair with OpenStax textbooks.



In addition to the OER Commons' OpenStax hub, instructors can also access ancillary content for OpenStax texts through the **Instructor Resources** tab on any OpenStax textbook. To use the instructor resources provided by OpenStax, you will need to verify your identity to ensure that students cannot get easy access to homework or review answers.

[PhET Interactive Simulations \(PhET Sims\)](#)

PhET provides free, interactive, research-based science and mathematics simulations. These simulations cover topics taught in K-12 and higher education contexts, with primary coverage for Physics, Biology, Mathematics, Chemistry, and Earth Science.

[MyOpenMath](#)

MyOpenMath, “a free, open source, online course management system for mathematics and other quantitative fields,” is an exceptional example of a tool for sharing open ancillary materials.¹ The site does require a login to ensure that only instructors can access the answers to exercises, but otherwise, its content is open and free to access.

What makes MyOpenMath stand out is that it is a program used to create and share problem sets with students in one easy place. It does not require copying homework sets into a Learning Management System or other product to make it work. This “plug-and-play” system has been lacking in many OER platforms because, since OER are free to access, supporting software updates and upkeep can be difficult.

[LibreTexts](#)

Founded by UC Davis professor Delmar Larsen for Chemistry, LibreTexts has evolved into “a multi-institutional collaborative venture to develop the next generation of open-access texts to improve postsecondary education at all levels of higher learning.” The site now contains resources for thirteen subject areas and its content has been adopted for more than 150 courses.

Each subject area in LibreTexts contains a mix of content such as texts, homework exercises, interactive applications, visualizations and simulations, laboratory experiments, and worksheets. Although the resource still leans toward the physical sciences, it also carries materials for mathematics and statistics.

In 2018, LibreTexts received \$5 million from the U.S. government to continue to develop OER and additional ancillary content. As they explain in their press release,

“this will involve going beyond adding new content to expanding the range of online services available to faculty developers and student users including a single sign on, interactive 3D visualizations, embedded executable source code, big data informatics, the ability to include personal and class wide annotations, and intelligent coupling into learning management systems.”²

See the [LibreTexts advanced features list](#) for more information about tools that have been implemented or are still in development.

1. MyOpenMath. "About Us." Accessed May 12, 2019. <https://www.myopenmath.com/info/aboutus.php>

2. Larsen, Delmar. "LibreText Project Announced \$5 Million Federal Award." October 2, 2018. <https://libretexts.org/officialPressRelease.pdf>

Commercial Ancillary Resources (Not OER)

Over the last five years, some OER providers and traditional textbook publishers have begun offering paid ancillary content intended to pair with OER.³ If you aren't certain about using only open materials in your course, this option might be a good place to start, since it lets you test out open textbooks along with advanced, paid ancillary content. However, we recommend that you discuss your options with an instructional designer, OER expert, and the campus bookstore before choosing one of these platforms for your course.

[Lumen Learning Online Homework Manager](#)

Lumen Learning has been a major partner in the open education movement since the early 2000s. In fact, David Wiley, the author of the 5 Rs of open content, is also one of the founders for Lumen Learning. Besides offering comprehensive open textbooks, Lumen also offers 3 paid platforms that supplement their open content: Candela, Waymaker, and Online Homework Manager (OHM). For this section, we will focus on OHM.

Lumen OHM is a customizable, interactive homework manager for mathematics courses. It provides support for courses in Prealgebra, Algebra, Precalculus, Calculus, Chemistry, Finite Math, Math for Liberal Arts, Statistics, and Trigonometry. Lumen Ohm costs \$25 per student per course.

[Rover by OpenStax](#)

OpenStax is a provider of both open and paid content. One of their newer content platforms is Rover by OpenStax, a tool that provides mathematics homework to supplement the OpenStax textbooks for Algebra and Trigonometry, Precalculus, and College Algebra.

Rover is designed to help students master mathematical problems in an interactive interface. The tool automatically grades assignments and provides feedback to students as they complete problems. Rover costs \$22 per student per course.

[Intellus Open Courses](#)

Managed by Macmillan, Intellus Open Courses is a commercial tool that brings together open content and publisher-produced content into a curated set of course materials.⁴ These curated courses include OER (usually OpenStax textbooks), primary source content, assessments, and interactive content such as quizzes and videos. Intellus Open Courses cost \$15 per student per course.⁵

3. Paid content created to accompany OER is not in itself OER, even if it is advertised as such. There are many nuances to this situation and we recommend reading the following article for additional information: Bell, Steven. "OER's Road Ahead is Paved with Publisher Platforms." *Library Journal*. 2017. <https://www.libraryjournal.com/?detailStory=oers-road-ahead-is-paved-with-publisher-platforms-from-the-bell-tower>

4. Please note that although the word "open" is in Intellus' product name, this does not mean that their paid platform is an OER. Instead, the name is acknowledging that they include resources to supplement the OER they use, usually OpenStax textbooks.

5. For additional information about paid platforms that include OER, check out the [Commercial Platforms that Utilize OER Assessment Tool in Google Sheets](#).

In this chapter, we looked into a few options for accessing ancillary content you can pair with OER online, including both open and commercial materials. In the next chapter, we'll look into how your students can access your course's OER in print, and why you might want to consider that option as well.

OER IN PRINT

Learning Objectives

By the end of this chapter, you will be able to:

- Explain why students might want to access a print copy of an OER.
- Identify three options for acquiring an OER in print.

Physical copies of course materials are sometimes preferred by both students and instructors. Since OER are typically created as digital objects first, it can be difficult to picture them as physical items, but many OER come in low-cost print versions as well. In this chapter, we'll review some of the reasons why and how you might offer a print option for your text-based OER.

Why Print?

There are many reasons why your students might want to access an OER in print, even at a price. A few of these are listed below:

- Students who do not own a laptop might want to have a print copy of their text for use in the classroom.
- Some students have issues with eye strain when reading on computer screens.
- Some students find it easier to retain information from print texts.
- Some students (and instructors!) prefer having physical manuals for use in labs.

Although not all students will want to purchase your materials in print, having the option available might be a worthwhile endeavor for your course.

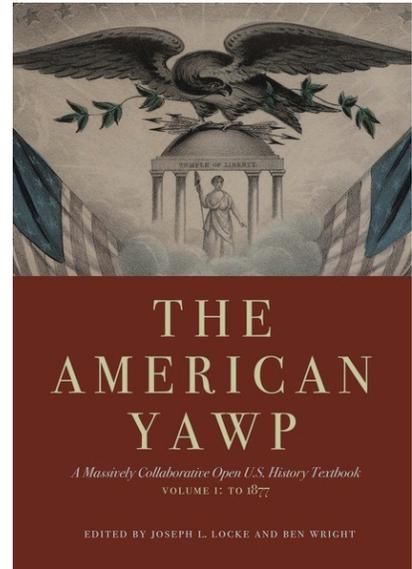
Purchasing Copies

One option for accessing OER in print is to purchase publisher-produced copies. For example, OpenStax, a Rice University-based open textbook publisher, provides bulk printing through textbook providers that contract with university bookstores. Campus bookstores can order copies of OpenStax textbooks and other OER which have print copies available for sale.

[The American Yawp](#) is a prime example of a university press-distributed open textbook. First released in print in 2018, the massively collaborative United States History textbook is one of the most popular history OER in use today. New editions of the text are released regularly and the book's update history is provided on its host website.

Even if the publisher of your chosen OER does not sell physical copies of their resource, you can commission copies through third-party platforms such as Lulu.com or Amazon. This can be an excellent option if you plan on rearranging chapters of your chosen text or if you are compiling a reader of various open resources.

Warning: Before ordering print copies of your text, keep in mind how your use of print materials will affect your students' engagement with your course.



The American Yawp: A Massively Collaborative Open US History Textbook, sold by Stanford University Press. 456 pages. \$24.95.

Considerations for courses using OER in print

- Should students be required to purchase a hard copy?
- Could you easily print and lend out copies of the OER to your students?
- How will you explain to students where the OER can be found for free online?

Printing on Campus

If the OER you want isn't available to purchase in print and you don't want to commission print copies on a third-party platform, you can also consider printing copies on campus.

University Printing Services

Campus Printing Services is an excellent option for getting a text-based resource ready for print. Keep in mind that the price of your resource will vary depending on the printing specifications you choose (e.g., ring-bound, softcover, black and white, full color). To make things easier for your students, you should

work with printing services and your bookstore to get your book in the best possible format for your needs.¹

Student-Printed Copies

If you aren't certain whether your course could benefit from using OER in print, you can choose not to offer a print version. In this case, individual students can print personal copies of the text for themselves. Students provided with print credits on campus can print individual chapters or sections of your material or they can print the full text of your book or manual at a store like Staples.

The Non-Commercial Discussion

There is a cost to print any resource, even an open one. Since the Non-Commercial (NC) Creative Commons licenses do not permit reuse for commercial purposes, this might make you think that you cannot access Non-Commercial OER in print; however, that is not the case. Open educational resources with CC BY NC licenses can be printed and sold at cost or with standard university bookstore markups, but they cannot be sold for a profit.² Some quick rules of thumb for using Non-Commercial CC-licensed OER content are outlined below:

- The CC BY NC license gives the rightsholder of a work complete control over its commercialization. The author can sell copies for a profit, but no one else can unless the author gives express permission.³
- The CC BY NC license allows for copies of a work to be sold at cost. Printing copies of another creator's work through a third party like Staples or Lulu.com is allowed under the CC BY NC license, as long as you do not sell those copies for a profit.
- Items licensed CC BY NC can be distributed to students by a for-profit company or private university without breaking the terms of its license: what matters is the characterization of the use, not the user.



An interactive H5P element has been excluded from this version of the text. You can view it online here:
<https://iastate.pressbooks.pub/oerstarterkit/?p=300#h5p-8>

1. Maximizing reuse while also keeping prices low is a necessity. Not all students will choose to purchase the print when the full text of your OER is also free online.

2. *Creative Commons Wiki*. "NonCommercial Interpretation," Last modified October 15, 2017. https://wiki.creativecommons.org/wiki/NonCommercial_interpretation

3. If you require that your students buy copies of your work at a profitable price, your resource is technically no longer an OER.

TEACHING WITH OER

ASSESSING COURSE OUTCOMES

Learning Objectives

At the end of this section, you should be able to:

- Describe why assessment is used for teaching & learning.
- Explain the difference between assessing traditional and open course materials.

Assessment is an integral part of the education process, a method used as a barometer for what changes may be necessary to improve teaching and learning. Assessment is not always a simple process, so it can help to get some support understanding key concepts.

Assessment in the Classroom

Assessment can occur at any time during or after a course. It is recommended that instructors assess their course regularly, but especially when incorporating new techniques or course materials for the first time. The National Research Council describes the assessment process as a constantly evolving enterprise:

“What is important is that assessment is an ongoing activity, one that relies on multiple strategies and sources for collecting information that bears on the quality of student work and that then can be used to help both the students and the teacher think more pointedly about how the quality might be improved.”¹

One popular method of assessing a course is to investigate whether the learning outcomes you selected for the course have been met.

Learning Outcomes

Elhabashy defines **Student Learning Outcomes (SLOs)** as

“the specific observable or measurable results that are expected subsequent to a learning experience. These outcomes may involve knowledge (cognitive), skills (behavioral), or attitudes (affective) that provide evidence that learning has occurred as a result of a specified course, program activity, or process.”²

These learning outcomes are used as benchmarks for assessing student learning and, by proxy, your own teaching. Perhaps the most important type of SLOs are **Course Learning Outcomes (CLOs)**. CLOs are the final outcomes that an instructor expects their class to have gained once they leave a course.³ These should be measurable items, outcomes for which you can create effective assessments.

1. National Research Council. *Classroom Assessment and the National Science Education Standards*. Washington, DC: The National Academies Press, 2001. DOI: <https://doi.org/10.17226/9847>.

2. Elhabashy, Sameh. *Formulate Consequential Student Learning Outcomes*. Baltimore: John Hopkins University Press, 2017.

3. Elhabashy, Sameh. *Formulate Consequential Student Learning Outcomes*.

Anytime you adjust your syllabus, course schedule, or learning materials, it can be helpful to consult your CLOs to ensure that the new structure you are making for your course is able to accommodate the needs of learners and facilitate the development of your learning outcomes.

CLO Example from Library 160: Information Literacy

After completing this course, students will:

- recognize how information creation, dissemination, and the research process can impact what is available on a given topic;
- recognize that information has value and identify how the information you produce is used online;
- appropriately relate information needs to search strategies, tools, and types of information sources, including recognizing and interpreting different types of citations;
- appropriately use the web for research, including critical evaluation of information;
- adhere to academic integrity policies, including those on plagiarism and copyright.

Course learning outcomes can be an invaluable part of the course transformation process for departments hoping to flip courses to open. As Tidewater Community College explained the process for their Z-degree pilot, in which a selection of courses taught at the university were transformed to use OER and other no-cost course materials:

“The faculty team began by stripping each of the 21 courses down to the course learning outcomes and rebuilding them, matching OER to each outcome... Courses were designed consistent with college’s academic and instructional design requirements, and were subjected to a strict copyright review.”⁴

Now that you have an overview of the types of goals you can set for your course, let’s move on to the processes available for assessing whether your students (and, by extension, your teaching) have met them.

Types of Assessment

The point of assessment is to ensure that learning objectives are being met and that your teaching is helping students develop the skills they ought to be achieving throughout your course. The assessment techniques you implement will depend on your preference and the standards in your field, but to help you get started, we’ve listed a few standard assessment types below:

- **Formative Assessment:** An ongoing process with a wide variety of formats, formative assessment can include quizzes, papers, projects, and any other formal or informal tests provided to gauge your students’ understanding of course content.

4. Wiley, David, et al. "The Tidewater Z-Degree and the INTRO Model for Sustaining OER Adoption." *Education Policy Analysis Archives* 23, no. 41 (2016). DOI: <https://doi.org/10.14507/epaa.24.1828>

- **Summative Assessment:** The final assessment of student learning after a course has completed, summative assessment can include final papers, projects, or exams. Summative assessment should be used to assess both standard teaching procedures and the effectiveness of any changes made following the formative assessments provided throughout your course.
- **Student Self-Assessment:** Methods for allowing your students to rate their own confidence in their work and their understanding of course content; examples include writing discussion board posts, drafting exam questions, and filling out confidence rating scales on exams.⁵
- **Student Peer-Assessment:** The process by which students evaluate the work of their peers within a course, peer assessment is often used as a learning tool to help students reconsider their own understanding of course content as they evaluate the work of their peers.⁶
- **Student Assessment of Teaching (SATs):** The manner in which students report on the effectiveness of an instructor's teaching on their learning, often given at the end of a course but sometimes handled as an ongoing process. The most ubiquitous SATs are student surveys given at the end of a course.

For additional approaches to classroom assessment, the Iowa State University Center for Excellence in Learning & Teaching (CELT) has compiled a [website listing quick assessment strategies](#).

After reviewing these more traditional assessment types, you might wonder how the assessment for a course using OER differs.

Assessment for OER

Assessment for courses utilizing OER does not have to be any different than for courses utilizing traditional materials. Nonetheless, some individuals have developed assessment techniques for the open classroom in particular. One of these is the RISE Framework.

The RISE Framework (Resource Inspection, Selection, and Enhancement) utilizes a 2 x 2 matrix of High Grade/Low Grade and High Use/Low Use to determine how much the use of OER has affected a student's learning outcomes.⁷ The RISE Framework is used to determine how well a student performed in a course and to contrast that outcome with how much they used their provided course materials. This method can help delineate between students who excel in a subject by default and those who have done well in a course thanks to the use of the provided course content. A package in R has been developed for running a RISE analysis quickly and easily. [The RISE package for R](#) is openly available in Zenodo.

5. Sorenson-Unruh, Clarissa. "Ungrading: The First Exam." *Reflective Teaching Evolution*. May 1, 2019. <https://clarissasorensenunruh.com/2019/05/01/ungrading-the-first-exam-part-3/>

6. Stanford Teaching Commons. "Peer Assessment." Accessed July 1, 2019. <https://teachingcommons.stanford.edu/resources/teaching/evaluating-students/assessing-student-learning/peer-assessment>

7. Bodily, Robert, Nyland, Rob, and Wiley, David. "The RISE Framework: Using Learning Analytics to Automatically Identify Open Educational Resources for Continuous Improvement." *International Review of Research in Open and Distributed Learning* 18, no. 2 (2017). DOI: <https://doi.org/10.19173/irrodl.v18i2.2952>

In the end, what assessment techniques you employ in your course will be determined by a variety of factors, some of which will be out of your control. Nonetheless, it's important to understand why you're assessing your course and the impact that assessment can have, particularly for courses changing their materials.

For more information about assessment in the classroom, visit the ISU Center for Excellence in Learning & Teaching's [Assessment & Evaluation website](#) or talk to an instructional designer about your course. In the next chapter, we will transition to talk about how you can get involved in the development of OER.

OPEN PEDAGOGY

Learning Objectives

By the end of this section, you will be able to:

- Provide a definition for open pedagogy.
- Describe the major components of a renewable assignment.
- List three tools commonly used for the creation of renewable assignments.

Free access to materials is not the only benefit provided by using OER. Another aspect of OER that is commonly commended by instructors is the academic freedom that using openly-licensed content affords them in taking control of their classroom and engaging students in learning.

Innovation in the Classroom

The **open licenses** on OER allow instructors to adapt and integrate materials into their classes in new ways, incorporating topics of local interest or translating content into another language. Instructors who teach graduate-level courses or courses in niche subject areas are often drawn to OER for two reasons:

1. They can adapt existing materials to meet the specific needs of their class.
2. They can share created materials with other instructors in their subject area around the world.

Developing new open educational resources can be incredibly impactful, especially for instructors who feel they are underserved by the traditional textbook model and market.

Open Pedagogy

Using open educational resources in the classroom can make it easier for students to access and interact with course materials. However, another major aspect of Open Education asks not “what you teach with” but “how you teach.” The set of pedagogical practices that include engaging students in content creation and making learning accessible is known as **open pedagogy**.

As DeRosa & Jhangiani explain, “one key component of open pedagogy might be that it sees access, broadly writ, as fundamental to learning and to teaching, and agency as an important way of broadening that access.”¹ DeRosa & Robison expand on this topic, explaining that:

“students asked to interact with OER become part of a wider public of developers, much like an open-source

1. DeRosa, Robin and Jhangiani, Rajiv. "Open Pedagogy and Social Justice." *Digital Pedagogy Lab*. June 2, 2017. <http://www.digitalpedagogylib.com/open-pedagogy-social-justice/>

community. We can capitalize on this relationship between enrolled students and a broader public by drawing in wider communities of learners and expertise to help our students find relevance in their work, situate their ideas into key contexts, and contribute to the public good.”²

Depending on the source you consult, open pedagogy might be a series of practices, a learning style, or a state of mind. For the sake of this chapter, open pedagogy is defined as a series of practices which involve engaging students in a course through the development, adaptation, or use of open educational resources.

One method of engaging in open pedagogy is the development of renewable assignments, assignments which students create for the purpose of sharing and releasing as OER. These can range in content from individual writing assignments in Wikipedia to collaboratively-written textbooks.³⁴ Wiley & Hilton compiled the criteria in **Table 2** to distinguish between different kinds of assignments, from least to most open.⁵ You can explore more examples of open pedagogy in action in the [Open Pedagogy Notebook](#).

Table 2: Wiley & Hilton’s (2018) Criteria Distinguishing Different Kinds of Assignments

	Student creates an artifact	The artifact has value beyond supporting its creator’s learning	The artifact is made public	The artifact is openly licensed
Disposable assignments	Yes	No	No	No
Authentic assignments	Yes	Yes	No	No
Constructionist assignments	Yes	Yes	Yes	No
Renewable assignments	Yes	Yes	Yes	Yes

Tools for implementing renewable assignments

- **Hypothes.is:** One of the tools commonly used for open pedagogy projects is Hypothes.is. Hypothes.is allows users to annotate websites and online readings easily. Using hypothes.is can let students engage with your course readings and each other in a more interactive way than discussion boards might allow.
- **Wikibooks:** Wikibooks and WikiEdu are both excellent tools for working with students to create a text. Alternatively, short student projects, such as annotated bibliographies, can be done via Wikipedia by adding context and citations to short or underdeveloped articles. This not only gives students the opportunity to get experience explaining concepts for a public audience, it also increases the available public knowledge on your course’s topic!
- **Google Drive:** Google Drive provides a variety of tools that can be used for collaboration on text-

2. DeRosa, Robin and Robison, Scott. "From OER to Open Pedagogy: Harnessing the Power of Open." In *Open: The Philosophy and Practices that are Revolutionizing Education and Science*, edited by Rajiv Jhangiani and Robert Biswas-Diener, 115–124. London: Ubiquity Press, 2017. DOI: <https://doi.org/10.5334/bbc.i>.

3. Villeneuve, Cassidy. "Editing Wikipedia in the Classroom: Individualized Open Pedagogy at Scale." *Open Pedagogy Notebook*. May 17, 2018. <http://openpedagogy.org/course-level/editing-wikipedia-in-the-classroom-individualized-open-pedagogy-at-scale/>

4. DeRosa, Robin. "Student-Created Open “Textbooks” as Course Communities." *Open Pedagogy Notebook*. March 18, 2018. <http://openpedagogy.org/course-level/student-created-open-textbooks-as-course-communities/>

5. Wiley, David and Hilton III, John. "Defining OER-Enabled Pedagogy." *The International Review of Research in Open and Distributed Learning* 19, no. 4 (2018). <http://www.irrodl.org/index.php/irrodl/article/view/3601/4724>.

based projects as well as slideshows and spreadsheets.

- **Youtube:** Student-made instructional videos or class projects can be incredibly useful to showcase for future students in the class or to use as supplemental materials for explaining difficult concepts.

Check Your Understanding

Brainstorm some renewable assignments. Do you already assign work that could be defined as renewable?

CONSIDERATIONS FOR USING OPEN PEDAGOGY

Learning Objectives

By the end of this chapter, you should be able to:

- List three considerations to keep in mind before changing your teaching style.
- Explain why it is important to scaffold learning in open pedagogy courses.

Before jumping in with open pedagogy, you should keep in mind how you will support students through the changes you plan to make. Ward (2017) discussed some of these considerations in an interview with Rajiv Jhangiani, a leader in the field of open pedagogy:

“When taking that approach, [Rajiv] said, it is important to give students control over their work. Let them choose Creative Commons licenses they are comfortable with. Allow them to later remove online work they decide is inferior. At the same time, scaffold assignments so that students gradually build skills and improve their ability to produce high-quality work.”¹

If you are interested in utilizing open pedagogy in your courses, first consider how this will affect your students.

Understand your tools

You don't have to use a snazzy tool or technology to make open pedagogy work. Make sure that you are choosing a tool or technology that your students can easily learn and– if it is not already familiar to them– that you have included time in your course for teaching students how to use your chosen tool.

1. Ward, Doug. "Turning open education into a social movement." *UK Center for Teaching & Excellence blog*, April 2017. <http://cteblog.ku.edu/turning-open-education-into-a-social-movement/>

Scaffold learning

Not all students will be familiar with technology or able to engage with OER quickly. It's important that you scaffold technology support into your teaching so all students can be on the same page when it comes to using the tools you've created or adopted.²

Some methods for scaffolding learning are provided below:

- Integrate interactive exercises into your class to help students work through new concepts.
- Create tutorials on how to use any technology or tool unique to your class.
- Use blogs and discussion posts to introduce the concept of writing for a public audience.
- Give students the choice between set assignment types to accommodate learners with different technical competencies.



"Wikibooks logo" by Bastique, Ramac, et al is licensed [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0/).

Educate students about copyright

It's important that students who are creating items that might be published and shared openly can understand what that means. If you're uncomfortable about discussing copyright with your students, university librarians can visit your class to make this process easier.

Considerations

- Your students don't need to be copyright lawyers to feel safe using OER. Focus on building a comfortable foundation of knowledge about CC licenses: the rest, if necessary, can come later.
- If you'd like your students to learn more about this topic but don't know where to start, consider reaching out to your subject librarian or a copyright support person on your campus.
- Alternatively, you can adopt an OER to teach your students about copyright, such as Larysa Nadolny's [Copyright & Fair Use for K-12 Educators](#).

Be considerate of student privacy

Some students will be energized by the idea that their homework can be seen, used, or even improved

2. Kim, Minchi C. and Hannfin, Michael J. "Scaffolding problem solving in technology-enhanced learning environments (TELEs): Bridging research and theory with practice." *Computers & Education* 56, no. 2 (2011): 403-417. DOI: <https://doi.org/10.1016/j.compedu.2010.08.024>

upon by future students in the class. Others may feel uncomfortable with this step. Allow students to opt out of making their materials public if they are uncertain about doing so and give them the option to remove their name from public documents if they are uncertain about this for any reason.

Considerations

- Explain clearly how and where student-created course content will be shared in the course syllabus.
- Teach students their rights as content creators and allow them to opt out of sharing their assignments.
- Allow students to share their work without attaching their personal information to it, if they are concerned about this.
- Reaffirm students' interest in publicly sharing their materials with each assignment that will be posted.

These are only a few concepts to keep in mind when exploring open pedagogy in your course. You can learn more about this topic in the [Open Pedagogy Notebook](#).

CENTERING DIVERSITY AND INCLUSION

Learning Objectives

By the end of this chapter, you will be able to:

- Explain how your cultural and class-based perspectives can affect your course content, for better or worse.
- Provide two examples of activities to encourage inclusivity in your course.

Adaptability and affordability are two major aspects of what makes an open educational resource attractive to students, but there is another facet that should be considered when you are developing or adapting an OER for your course: perspective. In particular, you should ask yourself how the perspectives being represented in your OER might affect the **inclusivity** of your course environment.



Tara Robertson's 2017 OpenCon talk, "Diversity, Equity, and Inclusion in Open Research and Education" asks whose voices are included in our work and whose are missing.

As Quill West argues in her blog post on diversity and inclusion in open education:

"As important as access is to students and to institutions, it is a starting place for leveraging other benefits of OER, and I hope that our conversations about [open education] go beyond access, because saving money on materials doesn't address bigger issues in student persistence and completion."¹

1. West, Quill. "Overview of EDI and Open Education." CCCOER blog, June 28, 2018. <https://www.cccoer.org/2018/06/28/on-equity-diversity-inclusion-and-open-education/>

In this chapter, we will discuss some of the opportunities and drawbacks of using OER to promote inclusivity in your courses.²

Diversity and Inclusion

Merriam-Webster defines diversity as “the inclusion of different types of people (such as people of different races or cultures) in a group or organization.”³ Diversity is often perceived as an organizational goal or ethical preference: for OER, including diverse perspectives is vital.

Diversity in open education can be achieved by including a variety of sociological perspectives in your open content. Doing this ensures that your students can identify with and relate to your course material. Critical here is ensuring that other cultures are presented accurately in your materials, and not according to stereotypes or perceptions based on the standards of your own culture.⁴

Whether intentional or not, ethnocentrism — “a tendency to view alien groups or cultures from the perspective of one’s own” — can creep into the content and presentation of your course materials, and it is something all authors should be aware of. This doesn’t mean you must create course content that accurately portrays and includes all cultures and perspectives; however, you should be respectful toward other people and be aware of your biases as they arise.

One way you can accomplish this is by explicitly acknowledging the perspectives that are included in your content and those which are not. How has your social and cultural background reflected on the work you’ve created? What authors are being cited and acknowledged in your work, and why? Acknowledging that your perspective is limited while including other perspectives in your work can be an incredibly rewarding experience. Some benefits of including diverse perspectives in your course content include:

- Engaging more students because they recognize themselves or their life experiences in your course content
- Sharing content that appeals to instructors in a variety of educational settings
- Creating a more interesting reading and learning experience for your students and learners around the world

If you aren’t certain about how or where to add examples relevant to other cultures, that doesn’t mean your resource will never include these perspectives. Thanks to your OER’s open license, once your resource has been published, instructors from other countries, cultures, and socioeconomic backgrounds might choose to remix your work for their course’s needs. The changes they make might include:

- Translating the book into a different language

2. **Attribution:** "Diversity & Inclusion" was adapted from [Including all students](#) by SUNY OER Services, licensed [CC BY 4.0](#).

3. *Merriam-Webster's Dictionary*. "Diversity." Accessed June 1, 2019. <https://www.merriam-webster.com/dictionary/diversity>

4. Adding examples from other cultures is a good practice; however, if you don't know much about the type of people you are "including" in your resource, your inclusion might feel like alienation for students who belong to that group.

- Adjusting the content to meet the local cultural, regional, and geographical interests
- Revising the material for a different learning environment

Another option for making your work more inclusive from the beginning is to consider inviting instructors and professionals in your field to contribute to your OER; however, you should be aware of the ways in which your project's design may deter or welcome people of other ethnicities, races, and cultural backgrounds.⁵ For example, you may have set up regular meetings for those collaborating on your project at a time that is not feasible for a scholar living in a different time zone. Keep this and other considerations in mind if you would like people from other countries to collaborate on your project.

Advancing Inclusivity through Open Pedagogy

As we covered in our section about teaching with OER, open pedagogy can be a powerful tool for letting students take control over how they engage with and relate to their course content. In some ways, engaging students in the creation of OER can be seen as the ultimate way of allowing them to see themselves reflected in their work.

However, there can be some concerns with this approach as well. For example, your student body might be composed of a majority of one race, sex, or class, making the total “picture” of the course content created by your students less inclusive overall.⁶ Here are some considerations to keep in mind when having students create course content, especially if your course is covering a topic related to sex, race, or cultural studies:

- Ask students for their input on the inclusivity of your resources
- Think about how your OER could be more diverse (pictures, examples, etc)
- Watch out for harmful depictions of diverse populations from your students. Have a plan in place to address issues if they arise

Fostering an environment of inclusion where your students can engage with different cultural norms is an important aspect of the college experience, whether you are teaching Physics or Criminal Justice. Although it might be daunting to jump into creating an inclusive educational resource, keep in mind that OER can be improved upon and continually revisited by yourself and others.

Start by finding or creating an OER that works for you and avoiding pitfalls like ethnocentric and trans-exclusionary language. You can always revisit your chosen OER or work with others to improve upon it by adding more diverse examples later on.

Don't “Other” Your Students

When attempting to make your course materials more inclusive for your students, the first thing you

5. Rebus Community. "Diversity, Equity, and Inclusion in OER." YouTube video, 55:00. September 29, 2017. <https://youtu.be/rUiyiAT0uMQ>

6. Bali, Maha. "Critical Pedagogy: Intentions and Realities." *Hybrid Pedagogy*. September 9, 2014. <http://hybridpedagogy.org/critical-pedagogy-intentions-realities/>

should watch out for is the possibility of “othering” your students. Merriam-Webster defines othering as “treating or considering (a person or a group of people) as alien to oneself or one’s group (as because of different racial, sexual, or cultural characteristics).”⁷ Some best practices for avoiding othering include:

- Never assume your audience’s gender and/or gender identity, ability, or sexual orientation.
- Avoid calling the most commonly seen traits in your context “normal.”
- Make materials accessible for all students at all times.

Further Reading

- Powell, John A. and Menendian, Stephen. “The Problem of Othering: Towards Inclusiveness and Belonging.” *Othering & Belonging* 1, no. 1 (2016). <http://www.otheringandbelonging.org/the-problem-of-othering/>
- Kerschbaum, Stephanie L. “Anecdotal Relations: On Orienting to Disability in the Composition Classroom.” *Composition Form* 32, no. 1 (2015). <http://compositionforum.com/issue/32/anecdotal-relations.php>
- Murphy, JoAnna R. “Addressing Ageism in the 21st Century Classroom.” *Hybrid Pedagogy*. November 3, 2015. <http://hybridpedagogy.org/addressing-ageism-in-the-21st-century-classroom/>
- White, Erin. “Trans-Inclusive Design.” *A List Apart*. May 9, 2019. <https://alistapart.com/article/trans-inclusive-design/>
- Womack, Mark. “Sexist Pronouns.” In *A writing handbook*. 2016. <http://drmarkwomack.com/a-writing-handbook/style/sexist-pronouns/>

Disclaimer

I (Abbey Elder, the author of this work) am a cis white woman from the United States. I have not experienced the types of bias that affect those from marginalized backgrounds related to race, cultural background, and sexual orientation. I have tried to keep this chapter simple and to link out to external resources whenever applicable; however, there may be cases where my writing betrays my lack of experience with these topics.

If there is any part of this book you find to be one-sided or dismissive of any aspect of your identity, please contact me at aelder@iastate.edu. I welcome any comments or feedback that might improve my work and help inform my own understanding of this topic. Thank you.

7. Merriam-Webster's Dictionary. "Other." Accessed May 12, 2019. <https://www.merriam-webster.com/dictionary/other>

CREATING OER

PLANNING AND COMPLETING YOUR OER PROJECT

Learning Objectives

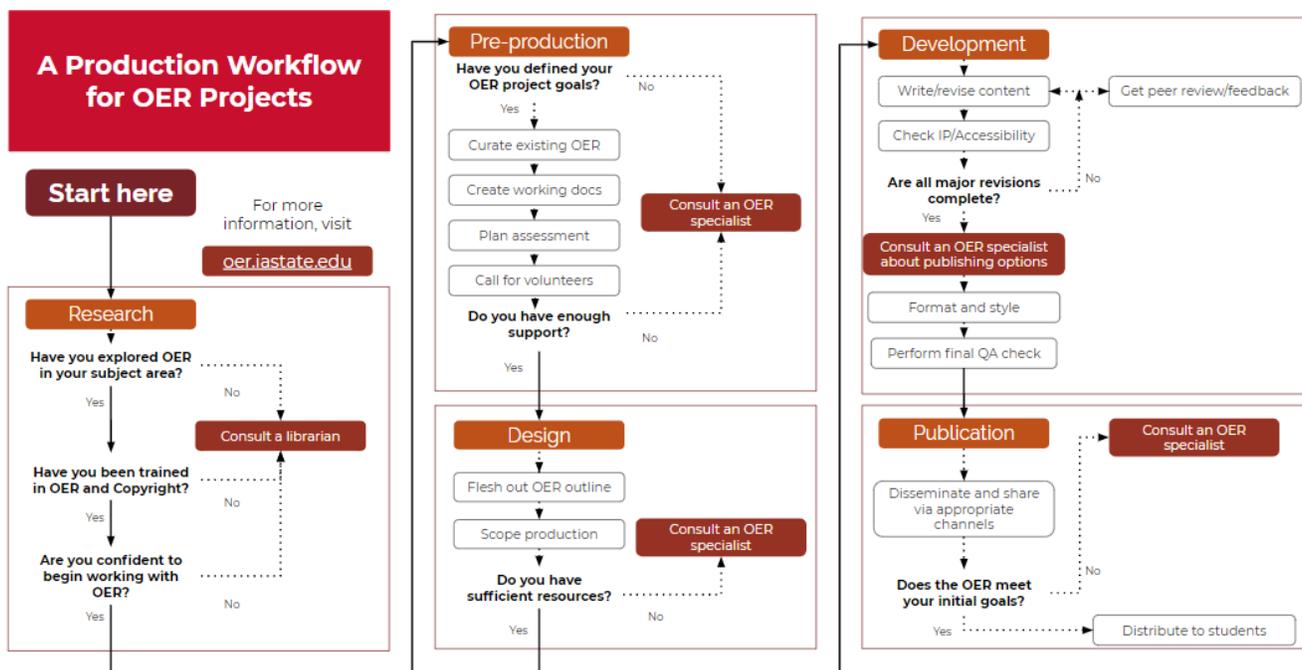
By the end of this chapter, you will be able to:

- Identify the 5 main steps of the OER creation process

Each OER project is different and rarely is an OER adoption a turn-key process. While OER textbooks exist for many high-enrollment courses, the pedagogical design (or teaching style) and student population will vary.¹

OER PRODUCTION FRAMEWORK

The following OER production framework, based on an instructional design framework, depicts the major steps that OER adoptions typically go through:



You can see [the full Project Production Workflow on Google Drawings](#).

1. Attribution: "Planning & Completing your OER Project" was adapted from [Scoping an OER Project](#) by Billy Meinke, licensed [CC BY 4.0](#).

Research Phase

At this step, you should ask yourself a few key questions to gauge your OER knowledge and skills before taking on a project. Have you explored OER content in your subject area? Have you been through any previous training for work with OER in the past? Contact support staff on campus to receive any training you might be lacking for working with open content.

Pre-production phase

This phase involves the curation of existing resources that may be applicable to the OER adoption and planning out the general design of the project. No new content should be adapted in this step, but a skeleton outline and other time-and-task-based project management documents should be prepared. Getting an OER consultation scheduled at this time is encouraged.

Design phase

This step is the last planning phase before work on the actual OER content begins. For projects adapting OER as-is, this may be the final step apart from preparing instructional documents. During this phase, project outlines and skeleton documents are fleshed out, and existing OER are fit into places where they are believed to be applicable. Any visual/graphic design work and processes that require assistance from an instructional designer are included here.

Development phase

This phase is where the most time is spent on OER projects that require building new materials. Existing OER that are being adapted or modified go through revision and review in a closed loop until they are in a place where they require only minor changes or copyedits. Checks for intellectual property (which CC license is on the content, and have we appropriately attributed everything?) are done, as well as checks for accessibility (is content formatted semantically, do images include alt-text, etc)?

Content here is typically drafted in Google Docs or another rich content editor (Word, OpenOffice) and are then ported into the publishing platform (the ISU Digital Press recommends Pressbooks for text-based content).

Publication phase

The final phase involves publishing and sharing the content that has been created. This includes creating export versions, archiving editable files for instructors who might wish to edit your work (.doc, .xml, etc), and depositing any ancillary materials such as syllabi or lesson plans in the institutional Digital Repository. The new adapted or original OER content is then disseminated to learners and shared with the open community.

TOOLS AND TECHNIQUES FOR CREATING OER

Learning Objectives

By the end of this chapter, you should be able to:

- Provide two examples each of low-tech, medium-tech, and high-tech tools for creating OER.
- Explain why an instructor might choose to develop OER using low-tech tools.
- Describe one medium- or high-tech tool you could use to develop an OER.

As we covered in our [Considerations for Using or Creating OER chapter](#), it's important to keep in mind some key factors before deciding to create a new OER. Some more in-depth tips for creating OER are outlined in this chapter.

Consider your Tools

Most educational resources today are “born digital,” meaning they are digital files before they are put into print or any other format. There is a wide variety of software and platforms available to assist with creating or editing digital content that can be used as OER, but it can be confusing to decide on which platform to use.¹

Low Tech

The simplest way to create educational resources is by using familiar word processing tools such as Microsoft Word, Google Docs, or Libre Office. This software includes most of the features needed for standard content, and the file can be easily exported as a PDF or printed. Additional low-tech options include:

- [LibreOffice Draw](#): Draw lets you produce anything from a quick sketch to a complex plan, and gives you the means to communicate with graphics and diagrams. Draw is an excellent package for producing technical drawings and other visual examples.
- [InkScape](#): An open source application that creates and edits PDFs and also works as a vector drawing and graphics tool. A better option for PDF editing if your document is image-heavy.

Medium Tech

Another common way to create or edit educational resources is to create a website or hosted resource.

1. **Attribution:** This chapter was adapted from the [SPARC Open Education Primer](#) created by the [SPARC Open Education Leadership Program](#), licensed [CC BY 4.0](#).

This could be in the form of a blog, a static website, or a wiki. WordPress can be a great tool for these sorts of medium-tech projects.

Check Your Understanding

Think about ways you could use Low- or Medium-Tech resources in your class. Is there a Medium-tech resource you're already using in your classes? Could you create and disseminate OER easily using that software, or do you need additional training to feel confident?

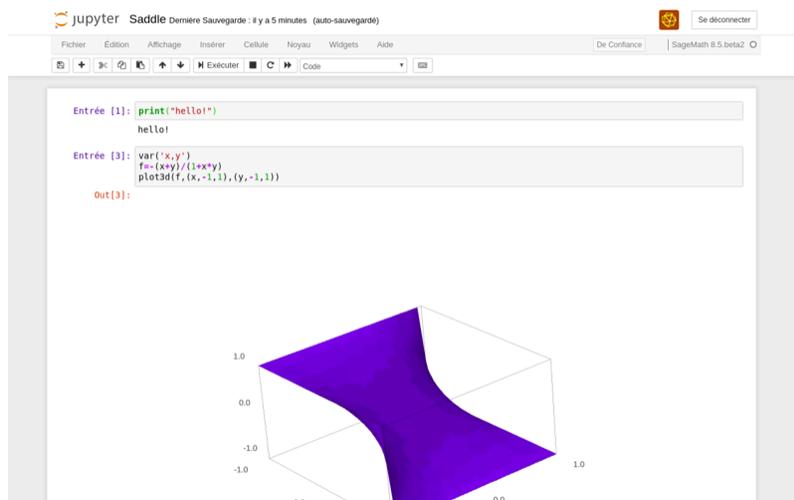
Look around your campus and see if there are workshops available on the software you want to learn.

Additional medium-tech options include:

- [Gnu Image Manipulation Program \(GIMP\)](#): GIMP is an open source, cross-platform image editor available for GNU/Linux, OS X, Windows, and other operating systems.
- [OER Commons Open Author](#): Open Author helps you build Open Educational Resources, lesson plans, and courses to share openly on the OER Commons platform.
- [Pressbooks](#): Pressbooks is a simple book formatting software. Some institutions, like Iowa State University, provide author support for publishing in Pressbooks through our Digital Press.

High Tech

There are a number of platforms that provide professional tools for authoring content, and some are very easy to use. A common tool used by OER projects is PressBooks (in which this text is published), a publishing software that makes it easy to produce interactive e-books and other text-based content. Other tools, like Jupyter Notebooks, may take time to master and require special expertise.



Attribution: *Sagemath Jupyter Screenshot* on [Wikimedia Commons](#) by Kilom691 is licensed [CC BY SA 4.0](#).

Additional high-tech options include:

- [GitBook](#): Created by GitHub, this open source tool allows you to create a book hosted on the GitHub platform. You can create your book in Markdown, add images and embed content from the Internet.
- [Bookdown](#): The bookdown package is an open-source R package that facilitates writing books and long-form articles/reports with R Markdown.
- [Jupyter Notebook](#): Jupyter Notebook is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text.

Be aware that some authoring platforms on the market include restrictions on how the final product can be published or shared. Before beginning, it is important to make sure you understand the terms of use and whether you will be able to move your work to a different platform if you choose.

Creating OER with Students

As we covered in our [Open Pedagogy chapter](#), there are many ways to get students involved in the creation and adaptation of OER. Assigning students to draft exam questions could bring immense value to your course, especially if those questions are built upon and improved by future students. Other work your students can collaborate on creating include literature reviews, course readers, and even full textbooks.²

Although your students may be new to some of the content covered in your course, if they can be engaged in creating something useful for future students, they may be able to better understand the material through this process; furthermore, students may find it easier to convey your course material in a way that other students will be able to understand. How and if you choose to include your students in content creation is up to you as the instructor, but there are many options available.

In the next chapter, we'll discuss how to create accessible and usable open content and how to assess your own materials for accessibility.

2. Mays, Elizabeth, et al. *A Guide to Making Open Textbooks with Students*. Rebus Community, 2017. <https://press.rebus.community/makingopentextbookswithstudents/>

ACCESSIBILITY AND USABILITY

Learning Objectives

By the end of this chapter, you should be able to:

- Provide three examples of ways an OER can be checked for accessibility.
- Explain how Universal Design for Learning is a good practice for both pedagogy and accessibility.

Accessibility is one of the things that will determine the usability of an OER for learners with diverse needs. Exemplary OER borrow many best practices from web design, ensuring that content is readable and works as intended for all users.¹

W3 Schools defines web accessibility as:

“Web accessibility means that people with disabilities can use the Web. More specifically, Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web. Web accessibility also benefits others, including older people with changing abilities due to aging.”²

Universal Design for Learning

Apart from more traditional aspects of accessibility, you can also make your course more accessible through the way(s) in which you present that content. One method is **Universal Design for Learning** (UDL), “a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn.”³

UDL claims that you can improve education for all learners by providing multiple ways of engaging with your course’s content. There are various ways to implement UDL in your teaching:

1. Represent ideas from different angles and in different media types to accommodate the diverse needs of learners.
2. Provide support for students to express their understanding of concepts in different ways.
3. Allow students to engage in different ways by providing a variety of assignment types.⁴

1. **Attribution:** This chapter was adapted in part from [The ABOER Starter Kit](#), by Technologies in Education at the Faculty of Education, the University of Alberta, licensed [CC BY 4.0](#).

2. W3 Schools. "Web Accessibility." Accessed May 15, 2019. <https://www.w3.org/WAI/bcase/soc.html#of>

3. CAST. "About Universal Design for Learning." Accessed July 15, 2019. <http://www.cast.org/our-work/about-udl.html>

4. CAST. "Universal Design for Learning Guidelines Version 2.2," 2018. Accessed July 1, 2019. <http://udlguidelines.cast.org/>

As the BC Campus OER Accessibility Toolkit (2015) argues, UDL principles can be applied to accessibility as well as learning. The toolkit provides the following examples for instructors:⁵

- Design resources that can be accessed by learners in a variety of ways. If there is a text component, provide the ability to enlarge the font size or change the text color.
- Provide multiple ways for learners to engage with information and demonstrate their knowledge.
- Identify activities that require specific sensory or physical capability and for which it might be difficult to accommodate the accessibility needs of learners (e.g., color matching activities).

Universal Design for Learning and **Universal Design** are two separate but interrelated concepts. While UDL is intended to improve both the accessibility and pedagogy of a learning environment, UD is primarily intended as an approach to making content accessible to as many people as possible.⁶ We focus on UDL in this chapter because the design of open educational resources is inextricably connected to how they will be implemented as learning objects. As an educator, thinking about UDL as a process tied to the creation, sharing, and use of course content is essential.

Software & File Format Choice

The usability of an OER is heavily impacted by how easily users can access it.⁷ Two aspects of content design that are inherently tied to accessibility are a resource's file format and the software used to access it.

Choose open file formats

If someone wants to read your work, they need to be able to open the file on their computer; however, some file formats require specific proprietary software to open. Saving your work in open file formats can give your students more options for accessing their course content on whatever platform best meets their needs.

Examples

- Open formats: HTML, ePub, RTF, Mobi, PNG, XML, PDF, Markdown
- Proprietary formats: MS Word, Pages, PowerPoint, Keynote

- [Markdown converter tool](#): The University of Oklahoma Libraries' Markdown Converter can be

5. Coolidge, Amanda, et al. *Accessibility Toolkit – 2nd Edition*. Victoria, BC: BCcampus, 2015. <https://opentextbc.ca/accessibilitytoolkit>

6. Edyburn, Dave L. *Accessible Instructional Design*. Bingley: Emerald Group Publishing Limited, 2015.

7. **Attribution:** "Software & File Format Choice" was adapted from "[Accessibility webpage](#)" by Affordable Learning Georgia and [UH OER Training](#) by Billy Meinke, licensed [CC BY 4.0](#).

used to easily convert your Markdown text into most other formats.

Use accessible software

Some software used to create or display content disables accessibility features built into your computer's operating system, such as zoom, text-to-speech, and speech-to-text. It is important to check whether the software students will use to view your course content disables the accessibility features of their computer's operating system. This can be an issue both for OER and for traditional, publisher-provided course content.

Considerations

- Is the software used to view the OER compatible with most assistive devices?
- Does the software require point-and-click interaction to work properly?
- Can the software menus be “seen” and properly interpreted by screen readers?

How to check software accessibility

- Check common assistive keyboard shortcuts while using the software.
- Ensure that users can navigate content using only the keyboard if necessary.
- Enable OS accessibility features and check their effectiveness with the required software.

How to access common accessibility features

- [Windows accessibility features](#)
- [Mac OS X accessibility features](#)

Image & Text Readability

Whenever you are presenting content to students, it's important to check whether the text in your course content is recognizable to a computer **as text**. For PDFs, accurate optical character recognition (OCR) is often required to make the text understandable. Screen-readers require this information to accurately relay text back to students. Other best practices for making course materials readable are listed in the sections below.

Use heading levels (h1, h2, h3)

Text-based OER should always have a clear and logical structure. Using headings and other structural elements to organize your resource can make it easier for all learners to access and understand the

material. Many editing tools support table of contents (TOC) generation based on where these section markers are placed. This can help students navigate to a specific chapter or section of a text, especially if the digital version of the resource has its TOC hyperlinked to each section within the text.

Individuals using screen readers can also more easily navigate the sections of your content when headings levels have been applied consistently.

Use true lists

While they may “look” similar to bulleted lists, using asterisks or icons to create a visual list of items can confuse a screen reader that is expecting to encounter structured content. Whenever listing items, use the true list features of your content editor, such as bullet points or numbered lists.

Examples

Good example:

- First list item
- Second one

Bad example:

- * First list item
- * Second item

Provide alt text & captions

No matter the subject of an image used in your content, you need to offer descriptive text. A screen reader will look for a contextual description of an image to share with readers, which should live in the text surrounding the image (title or caption) or as **alternative (“alt”) text**. This is one of the most commonly overlooked aspects of accessibility for instructional content, but most text editors include tools for adding alt text to images.

When adding alt text to an image, be sure to clearly and succinctly describe the most important elements for the student to know. Do not include extraneous detail. In some cases, you do not need to add alt text at all, as in the case of purely decorative images.

Examples

- Necessary descriptive alt text: “Part a of the figure shows a container which has a gas of volume V ”

subscript 1 on the left side and nothing on the right side. Part b shows a container which is completely filled with a gas of volume V subscript 2.”

- Too much descriptive alt text: “There is a figure with a white background and two squares labeled a and b. Part a has a rectangle (representing a container) with a shaded grey section on the left half of the container with dots representing a gas. The gas is labeled V subscript 1. Part b...”
- Unnecessary descriptive alt text: “An icon of a person smiling – I put this here as a cute picture to liven up the page!”

Video and audio content needs descriptive text as well, but these usually take the form of captions or, in the case of podcast recordings, transcripts. You can easily add captions to videos using Canvas’ Arc tool or by using YouTube’s built-in editor tools. For more help with this process, read through the excellent [Captioning Videos guide](#) from the University of Washington or reach out to an instructional designer near you.

Use descriptive link text

Ensure that all web pages and links have titles that describe a topic or purpose. The purpose of the link can be determined by the text alone. That is, you don’t need to include additional information justifying the use of the link. You want the link to be meaningful in context. For example, do not use generic text such as “click here” or “read more” unless the purpose of the link can be determined by meaning in the surrounding content.

Examples

Digital OER should have descriptive links that explain to where the hyperlink is going to navigate the reader.

- Good example: Information on the [BC Open Textbook Project](#) is available online.
- Bad example: Click [here](#) for information on the BC Open Textbook Project.

If the OER design does not permit the inclusion of explicit links in the text, implicit links can be used, and a more detailed list of sources should be provided at the end of the resource or in a separate document. Footnotes are a great way of providing more explicit links for content without cluttering the text on a page.

Use Accessible Fonts & Colors

OER should be readable for those with disabilities related to color as well. Some best practices for ensuring that fonts and colors are accessible are described below:

- Use dyslexic-friendly fonts, such as Arial, Century Gothic, Open Sans, and Verdana. Your institution might recommend certain fonts for digital and print materials. These recommended fonts are usually chosen for ease of use and accessibility and may be a good fit for your needs as well.
- Make sure there is a clear contrast between colors (e.g. between the background and font color, or between separate colors on a graph). There are many free online tools available for checking color contrast, but we recommend [WebAim's Color Contrast Checker](#) and [ContrastChecker.com](#).
- Do not use color to communicate meaning without other markers of that meaning present. If you have color-dependent information in images or within the text of your resource, be sure that either alternative methods of recognition (such as differing patterns) are present, or that the contrast can be adjusted by users.

Online Accessibility Tools

A great deal of OER content is displayed on websites, where we can use accessibility-checking tools to identify areas that can make it difficult for assistive technology tools to work properly. [The online WAVE tool](#) does just that: identifying errors and possible issues with the accessibility of websites.

[The Flexible Learning for Open Education \(floe\) website](#) provides access to a suite of tools intended to “supports learners, educators and curriculum producers in achieving one-size-fits-one learning design for the full diversity of learners.”⁸

8. For more information, see floe's Inclusive Learning Design Handbook online at <https://handbook.floeproject.org/> or visit their source code on GitHub: <https://github.com/fluid-project/>

Suggested Reading

While this toolkit is designed to provide you with what you will need to start using and creating OER, it is by no means the only resource available. This chapter provides an overview of other guides that can help you on your journey.

OER Handbooks

Aesoph, Lauri M. *Adaptation Guide: A Reference to Adapting or Revising an Open Textbook*. Victoria, BC: BCCampus, 2016. <https://opentextbc.ca/adaptopentextbook/>

Aesoph, Lauri M. *Self-publishing Guide: A Reference for Writing and Self-publishing an Open Textbook*. Victoria, BC: BCCampus, 2018. <https://opentextbc.ca/selfpublishguide/>

Coolidge, Amanda, Sue Doner, Tara Robertson, and Josie Gray. *Accessibility Toolkit – 2nd Edition*. Victoria, BC: BCCampus, 2015. <https://opentextbc.ca/accessibilitytoolkit>

Crump, Matthew J. *Open Tools for Writing Open Interactive Textbooks (and more)*. 2018. https://crumplab.github.io/OER_bookdown/

Doner, Sue and Susan Chandler. *OER Toolkit for Trades Instructors*. Victoria, BC: BCCampus, 2017. <https://pressbooks.bccampus.ca/oertoolkitfortrades/>

Falldin, Melissa and Karen Lauritsen. *Authoring Open Textbooks*. Minneapolis, MN: Open Textbook Network, 2017. <https://press.rebus.community/authoropen/>

Inclusive Design Research Centre. *FLOE Inclusive Learning Design Handbook*. 2017. <https://lincs.ed.gov/professional-development/resource-collections/profile-1004>

Mays, Elizabeth (Ed.). *A guide to making open textbooks with students*. Rebus Community, 2017. <https://press.rebus.community/makingopentextbookswithstudents/>

Meinke, William. *UH OER Training*. Manoa, HA: University of Hawaii at Manoa, 2018. <http://pressbooks.oer.hawaii.edu/oertraining2018/>

Moist, Shannon. *Faculty OER Toolkit*. Victoria, BC: BCCampus, 2017. <https://pressbooks.bccampus.ca/facultyoertoolkit/>

Munro, Daniel, Jenna Omassi, and Brady Yano. *OER Student Toolkit*. Victoria, BC: BCcampus, 2016. <https://opentextbc.ca/studenttoolkit>

Wiley, David (Ed.). *An Open Education Reader*. 2014. <https://openedreader.org/>

Wright, Lucas and Krista Lambert. *Working Group Guide*. Victoria, BC: BCCampus, 2019. <https://opentextbc.ca/workinggroupguide>

Research & Case Studies

Bodily, Robert, Rob Nyland, and David Wiley. "[The RISE Framework: Using Learning Analytics to Automatically Identify Open Educational Resources for Continuous Improvement.](#)" *International Review of Research on Distance and Open Learning* 18, no. 2 (2017).

Chiorescu, Marcela. "[Exploring Open Educational Resources for College Algebra.](#)" *The International Review of Research in Open and Distributed Learning* 18, no. 4 (2017).

Clinton, Virginia. "[Cost, Outcomes, Use, and Perceptions of Open Educational Resources in Psychology: A Narrative Review of the Literature.](#)" *Psychology Learning & Teaching* 18, no. 1 (2019): 4-20.

Coleman-Prisco, Virginia. "[Factors Influencing Faculty Innovation and Adoption of Open Educational Resources in United States Higher Education.](#)" *International Journal of Education and Human Developments* 3, no. 4 (2017): 1-12.

Grewe, Kim, and W. Preston Davis. "[The Impact of Enrollment in an OER Course on Student Learning Outcomes.](#)" *The International Review of Research in Open and Distributed Learning*, 18, no. 4 (2017).

Hendricks, Christina, Stefan A. Reinsberg, and Georg W Rieger. "[The Adoption of an Open Textbook in a Large Physics Course: An Analysis of Cost, Outcomes, Use, and Perceptions.](#)" *The International Review of Research in Open and Distributed Learning* 18, no. 4 (2017).

Koh, Adilene. "[Teaching with the Internet; or How I Learned to Stop Worrying and Love the Google In My Classroom.](#)" *Hybrid Pedagogy*. August 1, 2015.

Martin, Michael Troy, Olga Maria Belikov, John Hilton III, David Wiley, and Lane Fischer. "[An Analysis of Student and Faculty Perceptions of Textbook Costs.](#)" *Open Praxis* 9, no. 1 (2017): 79-91.

Page, Christina. "[Open Education, Justice, and Learning Strategies - What's the Connection?](#)" *Open Pedagogy Notebook*. August 2, 2018.

Wiley, David. "[The Evolving Economics of Educational Materials and Open Educational Resources: Toward Closer Alignment with the Core Values of Education.](#)" *Open Content*, January 13, 2017.

Wiley, David, Ashley Webb, Sarah Weston, and DeLaina Tonks. "[A Preliminary Exploration of the Relationships Between Student-Created OER, Sustainability, and Students Success](#)". *International Review of Research on Distance and Open Learning* 18, no. 4 (2017).

Additional Resources

Communities

[CCCOER](#): a growing consortium of community and technical colleges committed to expanding access to education and increasing student success through adoption of open educational policy, practices, and resources. We provide a community and resources to learn about the evolving practice of open education.

[COERLL](#): The Center for Open Educational Resources and Language Learning (COERLL)'s mission is to produce and disseminate language OER for the public (e.g., online language courses, reference grammars, assessment tools, and corpora).

[LIBOER](#): the SPARC Libraries & OER Forum (LibOER) is a vibrant community of practice for academic and research librarians interested in open education. Established in 2013, this network connects more than 1,000 subscribers primarily in the U.S. and Canada through a public email discussion list and a monthly community call.

[Rebus Community](#): a platform and forum for everyone working on open educational resources. It makes it easy to collaborate with others, conceive and create your project, and share tools, ideas, and processes.

Conferences

[OpenEd Conference](#): The largest US-based open education conference, OpenEd alternates between west- and east-coast venues each year and regularly hosts the largest names in Open Education, from practitioners to platforms.

[OER](#): The OER conference is the largest, international conference centering on the topic of open education. Managed by the Association for Learning Technology (ALT), a UK-based organization for learning technology, this conference is not one to miss.

[OpenCon](#): OpenCon is a conference focusing on openness writ large, from open education to open science.

[TAC](#): The Textbook Affordability Conference (TAC) is a place to explore OER and other affordability initiatives growing in North America. Supported by the National Association of College Stores, this

conference has a particular focus on affordability rather than openness, but OER is often a major talking point.

[Northeast OER Summit](#): The Northeast OER Summit, first begun in 2017, is a regional conference for instructors, instructional designers, and librarians to discuss their work in open education. Although located in the Northeast United States, the conference is open to participants worldwide.

[“E”ffordability Summit](#): The “E”ffordability Summit is an open education conference dedicated to being affordable for attendees. Hosted by the University of Wisconsin-Stout, the Summit has no registration fees and covers topics related to OER in both K-12 and higher education environments.

Glossary

Accessibility

Accessibility can be viewed as the "ability to access" something. The concept of accessible design and practice of accessible development ensures both "direct access" (i.e. unassisted) and "indirect access" meaning compatibility with a person's assistive technology (for example, computer screen readers). (Source: [Wikipedia.org](https://en.wikipedia.org))

Alt text

A word or phrase that can be inserted as an attribute in an HTML (Hypertext Markup Language) document to tell website visitors the nature or contents of an image. (Source: [Whatls.com](https://whatls.com))

Attribution

The process by which a content user gives proper credit to the original creator of a work when a portion of that work is reused or adopted outside of its original context. Attribution typically includes a link to the original work and information about the author and license.

Backward design

A model for designing instructional materials where the instructor or designer begins the design process with a focus on the desired results (i.e., the outcome) of instruction. (Source: [Learning-Theories.com](https://learningtheories.com))

Copyright

A set of intellectual property laws that give the rightsholder of a work (usually the author) exclusive rights over the reproduction, reuse, remixing, display, performance, and redistribution of their work.

Copyright license

A license permits users to certain rights over a copyrighted work. These can be exclusive (allowed for individual groups) or nonexclusive (allowed for all users). Licenses can be restricted by certain factors such as purpose, territory, duration, and media (Source: [Findlaw.com](https://findlaw.com)).

Course Learning Outcomes

The final outcomes that an instructor expects their students to gain by the time the students complete a course.

Creative Commons

A set of open licenses that allow creators to clearly mark how others can reuse their work through a set of four badge-like components: Attribution, Share-Alike, Non-Commercial, and No Derivatives.

Derivative works

A work based on or derived from one or more already existing works. Common derivative works include translations, musical arrangements, art reproductions, and abridgments. (Source: USLegal.com)

Fair Use

A legal doctrine that promotes freedom of expression by permitting the unlicensed use of copyright protected works in certain circumstances. In Canada, this is known as Fair Dealing.

Inclusivity

The practice or policy of including people who might otherwise be excluded or marginalized, such as those who have physical or mental disabilities and members of minority groups. (Source: [Oxford living dictionary](#))

Learning Management System (LMS)

A piece of software that manages, analyses, and runs educational courses. Canvas and Blackboard are two popular examples.

Licensing

The process by which a rightsholder (usually the creator of a work) dictates that others can reuse their work in specific ways.

Open access

A model by which content creators make their scholarly outputs free to access without cost to users. This can be done either by publishing content with an OA publisher or by sharing a copy of the content on an open repository.

Open educational practices

Practices which encourage the development of openness, community engagement, transparency, responsibility, sharing, and accountability in education. (Source: [Open Education Practices \[Wikibooks\]](#))

Open educational resources

Free educational materials that are openly licensed to enable reuse and redistribution by users.

Open license

A copyright license which grants permission for all users to access, reuse, and redistribute a work with few or no restrictions.

Open pedagogy

A set of pedagogical practices that include engaging students in content creation and making learning accessible to all.

Open science

An umbrella term for a movement comprised of a variety of practices aiming to remove barriers for sharing any kind of research output, including resources, methods, or tools created at any stage of the research process. (Source: [FosterOpenScience.eu](https://www.fosteropenscience.eu/))

Open source software

Software with source code that anyone can inspect, modify, and enhance. (Source: [OpenSource.com](https://opensource.com/))

Open textbook

An openly licensed and free to access textbook; an OER meant to be used as a textbook for a course.

Public Domain

A work which is not covered under copyright law, whose copyright has expired, or which has been dedicated to the public domain by its rightsholder is said to be in the public domain.

Student Learning Outcomes

The outcomes that an instructor expects their students to display at the end of a learning experience (an activity, process, or course). (Source: Elhabashy, 2017).

Universal Design

A process intended to design products that are usable by all people, with or without disabilities, to the greatest extent possible (Edyburn, 2015).

Universal Design for Learning

A framework to improve and optimize teaching and learning for all people based on the concept that, by providing multiple ways of engaging with content, the diverse educational needs of learners can be met.