

## Defining OER-Enabled Pedagogy

David Wiley et John Levi Hilton III

Volume 19, numéro 4, septembre 2018

URI : <https://id.erudit.org/iderudit/1055532ar>  
DOI : <https://doi.org/10.19173/irrodl.v19i4.3601>

[Aller au sommaire du numéro](#)

### Éditeur(s)

Athabasca University Press (AU Press)

### ISSN

1492-3831 (numérique)

[Découvrir la revue](#)

### Citer cet article

Wiley, D. & Hilton III, J. (2018). Defining OER-Enabled Pedagogy. *International Review of Research in Open and Distributed Learning*, 19(4).  
<https://doi.org/10.19173/irrodl.v19i4.3601>

### Résumé de l'article

The term “open pedagogy” has been used in a variety of different ways over the past several decades. In recent years, its use has also become associated with Open Educational Resources (OER). The wide range of competing definitions of open pedagogy, together with its semantic overlap with another underspecified term, open educational practices, makes it difficult to conduct research on the topic of open pedagogy. In making this claim we do not mean to cast doubt on the potential effectiveness of the many pedagogical approaches labeled open. In this article, rather than attempting to argue for a canonical definition of open pedagogy, we propose a new term, “OER-enabled pedagogy,” defined as the set of teaching and learning practices that are only possible or practical in the context of the 5R permissions that are characteristic of OER. We propose criteria used to evaluate whether a form of teaching constitutes OER-enabled pedagogy and analyze several examples of OER-enabled pedagogy with these criteria.

Copyright (c) David Wiley, John Levi Hilton III, 2018



Ce document est protégé par la loi sur le droit d'auteur. L'utilisation des services d'Érudit (y compris la reproduction) est assujettie à sa politique d'utilisation que vous pouvez consulter en ligne.

<https://apropos.erudit.org/fr/usagers/politique-dutilisation/>

Cet article est diffusé et préservé par Érudit.

Érudit est un consortium interuniversitaire sans but lucratif composé de l'Université de Montréal, l'Université Laval et l'Université du Québec à Montréal. Il a pour mission la promotion et la valorisation de la recherche.

<https://www.erudit.org/fr/>

September – 2018

## Defining OER-Enabled Pedagogy

David Wiley<sup>1,2</sup> and John Hilton<sup>2</sup>

<sup>1</sup> Lumen Learning, <sup>2</sup> Brigham Young University

### Abstract

The term “open pedagogy” has been used in a variety of different ways over the past several decades. In recent years, its use has also become associated with Open Educational Resources (OER). The wide range of competing definitions of open pedagogy, together with its semantic overlap with another underspecified term, open educational practices, makes it difficult to conduct research on the topic of open pedagogy. In making this claim we do not mean to cast doubt on the potential effectiveness of the many pedagogical approaches labeled open. In this article, rather than attempting to argue for a canonical definition of open pedagogy, we propose a new term, “OER-enabled pedagogy,” defined as the set of teaching and learning practices that are only possible or practical in the context of the 5R permissions that are characteristic of OER. We propose criteria used to evaluate whether a form of teaching constitutes OER-enabled pedagogy and analyze several examples of OER-enabled pedagogy with these criteria.

*Keywords:* OER-enabled pedagogy, open pedagogy, open learning, open educational practices

## Introduction

The term “open pedagogy” has a long history and has been used in many contexts. For example, Elliot (1973) describes a tension between “closed” and “open” pedagogies with the former tending to be more focused on didactic discussion and the latter being connected with leading less formal discussions and students co-creating the context of the class. Mai (1978) discusses open pedagogy in the context of creating an “informal classroom where children might be trusted to learn by exploring according to their own interests, instead of being bored, demeaned, and alienated” (p. 231). Dufeu (1992) argues that open pedagogy is a philosophy in which the content of the course, as well as its progression, is determined by the needs and preferences of participants. Daniel (2004) refers to open pedagogy as one “that treats the student as an intellectual equal” (p. 9).

The association of “open pedagogy” with student-centered approaches has been strengthened in recent years concurrent with the development of new technologies. Hodgkinson-Williams and Gray (2009) use the term to refer to “the opening up of educational processes...enabled by Web 2.0 technologies” and argue that open pedagogy will play a more transformational role than open content (p.101). An Athabasca University white paper written in 2011 associates open pedagogy with learning digital literacies and teaching that is centered on the pedagogy of discovery (Day, Ker, Mackintosh, McGreal, Stacey, & Taylor, 2011). Hegarty (2015) defines open pedagogy as a broad range of attributes from participatory technologies to innovation and creativity.

In addition, “open pedagogy” has become closely associated with the creation, use, and sharing of open educational resources (OER). Weller (2013) states that open pedagogy “makes use of...abundant, open content (such as open educational resources, videos, podcasts), but also places an emphasis on the network and the learner's connections within it” (p. 10). Wiley (2013) similarly emphasized the link between OER and open pedagogy. Other authors have preferred the related term “open educational practices,” which Cronin (2017) defines as “a broad descriptor of practices that include the creation, use, and reuse of open educational resources (OER) as well as open pedagogies and open sharing of teaching practices” (p. 16). The Open Educational Quality Initiative (OPAL; 2011) define open educational practices as “a set of activities around instructional design and implementation of events and processes intended to support learning. They also include the creation, use and repurposing of Open Educational Resources (OER) and their adaptation to the contextual setting. They are documented in a portable format and made openly available” (p. 13). Adding to the complexity, some people treat the term “open educational practices” as being synonymous with “open pedagogy,” while others hold them to be distinct from each other.

The connection between open educational resources and open pedagogy marks a significant departure from the way the term was used in the 20th and early 21st centuries. The “open” in open educational resources indicates that these materials are licensed with copyright licenses that provide permission for everyone to participate in the 5R activities - retain, reuse, revise, remix, and redistribute. Wiley (n.d.) describes the 5Rs in more detail:

- **Retain** - the right to make, own, and control copies of the content (e.g., download, duplicate, store, and manage).

- **Reuse** - the right to use the content in a wide range of ways (e.g., in a class, in a study group, on a website, in a video).
- **Revise** - the right to adapt, adjust, modify, or alter the content itself (e.g., translate the content into another language).
- **Remix** - the right to combine the original or revised content with other material to create something new (e.g., incorporate the content into a mashup).
- **Redistribute** - the right to share copies of the original content, your revisions, or your remixes with others (e.g., give a copy of the content to a friend).

For several years, advocates, practitioners, and researchers in the open education movement have worked to prevent the weakening of the term “open” by calling out examples of “openwashing” - attempts by people and organizations to apply the label “open” to contexts in which copyright restrictions prohibit teachers and learners from engaging in the 5R activities (Weller, 2013; Pomerantz & Peek, 2016). Those interested in OER care about the way the word “open” is used in educational contexts.

The wide range of variation in the many recent definitions of open pedagogy makes it increasingly difficult to make sense of the term, potentially leading to claims of openwashing and creating other practical problems in the context of teaching and learning practices. From a research perspective, the dearth of agreement on a common definition makes evaluating the impacts of open pedagogy on student learning, student engagement, and other metrics of interest essentially impossible since we cannot specify what we are evaluating. In making this claim, we do not mean to cast doubt on the potential effectiveness of the many pedagogical approaches labeled open. Indeed, many of these pedagogies are inspiring, have the appearance of effectiveness, and seem worthy of replication. However, in order to move research in the field forward, there is a need for clarity.

Rather than attempting to propose a single, canonical definition of open pedagogy, we propose a new term, “OER-enabled pedagogy.” We define OER-enabled pedagogy as the set of teaching and learning practices that are only possible or practical in the context of the 5R permissions which are characteristic of OER. Pedagogy is not generally described in terms of copyright, so we pause here to explain the relationship between permission to engage in the 5R activities and teaching and learning practices.

We accept as axiomatic that students learn by doing. The function of copyright is to prohibit people from engaging in broad categories of activity (e.g., making copies or creating derivative works) without permission from a rights holder. If students learn by doing, and copyright makes it illegal to engage in certain kinds of doing without a license, then copyright necessarily functions to limit the ways in which students can learn. The permissions to engage in the 5R activities that are granted in association with OER lift these restrictions. Consequently, when using OER, as opposed to traditionally copyrighted resources, students are free to engage in a broader range of activities and, therefore, to learn in a broader range of ways. The core ideas of OER-enabled pedagogy are in many ways a combination of openness as characterized by the 5Rs and Papert’s (1991) notion of constructionism. Papert writes that the simplest

definition of constructionism is “learning-by-making,” and relates the following story of how he arrived at the idea:

More than 20 years ago, I was working on a project at the Muzzey Junior High School in Lexington, MA, which had been persuaded by Wally Feuerzeig to allow a seventh grade to "do Logo" instead of math for that year. This was a brave decision for a principal who could not have known that the students would actually advance their math achievement score, even though they didn't do anything that resembled normal school math that year! But the story I really want to tell is not about test scores. It is not even about the math/Logo class. It is about the art room I used to pass on the way. For a while, I dropped in periodically to watch students working on soap sculptures and mused about ways in which this was not like a math class. In the math class students are generally given little problems which they solve or don't solve pretty well on the fly. In this particular art class they were all carving soap, but what each student carved came from wherever fancy is bred and the project was not done and dropped but continued for many weeks. It allowed time to think, to dream, to gaze, to get a new idea and try it and drop it or persist, time to talk, to see other people's work and their reaction to yours--not unlike mathematics as it is for the mathematician, but quite unlike math as it is in junior high school. I remember craving some of the students' work and learning that their art teacher and their families had first choice. I was struck by an incongruous image of the teacher in a regular math class pining to own the products of his students' work! An ambition was born: I want junior high school math class to be like that. I didn't know exactly what "that" meant but I knew I wanted it. I didn't even know what to call the idea. For a long time it existed in my head as "soap-sculpture math." (para. 8)

In soap-sculpture math, Papert (1991) saw that learning “happens especially felicitously in a context where the learner is consciously engaged in constructing a public entity” (para. 2) - something that others can see, review, critique, and value. In introducing the idea of OER-enabled pedagogy, we ask what it means to add the 5R permissions to these public entities - to be consciously engaged in either building upon work previously done by another or to construct a new public entity that explicitly offers other learners permission to publicly transform and adapt it. When student works are openly licensed, granting others 5R permissions in their use of the artifacts, each work becomes the beginning of an ongoing conversation in which other learners participate as they contextualize and extend the work in support of their own learning. Open licensing also ensures that these artifacts will be perpetually and freely available to all who wish to engage them as part of their learning. Rather than a single assignment that is completed, displayed, and archived (or recycled), the artifacts constructed in the context of open become a source of renewal and additional learning-by-making for later learners.

One concrete example of combining constructionism and openness into OER-enabled pedagogy is Wiley's (2013) notion of “renewable assignments,” which he contrasts with “disposable assignments.” Disposable assignments are those assignments that both faculty and students understand will ultimately be thrown away. Essays are examples of assignments that frequently fit into this category - students write the essays, faculty grade and provide feedback on the essays and return them to students, and students do or do not look through faculty comments and then throw the paper in the recycle bin (or delete it). In discussing disposable assignments, Wiley does not imply that these kinds of assignments cannot result in powerful

student learning for that student in that context. He only calls our attention to the fact that millions of hours of work are done, graded, and thrown away each year. We echo this concern over what seems to be a missed opportunity. In contrast to disposable assignments, Wiley introduces the idea of renewable assignments - assignments which both support an individual student's learning and result in new or improved open educational resources that provide a lasting benefit to the broader community of learners.

We might consider a continuum of criteria that distinguish disposable assignments from renewable assignments, as indicated in Table 1.

Table 1

*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	X			
Authentic assignments	X	X		
Constructionist assignments	X	X	X	
Renewable assignments	X	X	X	X

Thus, in determining whether a particular approach should be labeled OER-enabled pedagogy, it matters whether openly licensed resources are a vital part of the practice. We propose the following four-part test to determine the extent to which a specific teaching and learning practice qualifies as OER-enabled pedagogy, as exemplified by the idea of renewable assignments:

1. Are students asked to create new artifacts (essays, poems, videos, songs, etc.) or revise / remix existing OER?
2. Does the new artifact have value beyond supporting the learning of its author?
3. Are students invited to publicly share their new artifacts or revised / remixed OER?
4. Are students invited to openly license their new artifacts or revised / remixed OER?

In the remainder of the paper we provide several examples of OER-enabled pedagogy and analyze these examples using the four-part test listed above. We then close by providing suggestions for how future research on OER-enabled pedagogy might be conducted.

## Examples of OER-Enabled Pedagogy

Here we provide several examples of types of OER-enabled pedagogies. This set of categories is meant to be illustrative and not comprehensive.

**OER-enabled pedagogies resulting in the creation of supplementary learning resources designed to facilitate the learning of other students.** OER-enabled pedagogies can result in the creation of supplementary learning resources designed to improve the understanding of future students. Wiley, Webb, Weston, and Tonks (2017) describe how student-created OER in a secondary (middle and high school) setting helped improve student learning. The context for this study was a Digital Photography course at Mountain Heights Academy. Each semester that the course has been taught since its introduction in 2011, students were given the option to release their own photos with a Creative Commons license. The openly licensed photos were evaluated by the instructor and the best examples of each particular concept were selected to be integrated into the course and used by students in subsequent semesters.

Students were also offered extra credit to create tutorial videos, chapter summaries, and review games for a particular topic; these tutorial resources were also evaluated by the teacher and some were selected to be integrated into the course. Students who demonstrated high levels of mastery in the course were then offered the opportunity to be a teaching assistant for the upcoming semester. These students created additional materials, including guided notes for each unit that provide deeper explanations of concepts, study guides for exams, tutorial videos that provide scaffolding and support to learners who benefit from having the material presented from a different perspective or in a different medium, and review presentations and games that can assist students to learn in a variety of ways. These ancillary materials are all licensed as OER and added to the course after review by the teacher. The results of the study reported by Wiley et al. (2017) were that the average grade on student assignments rose significantly as more student-created OER were added to the course.

To examine the extent to which this approach qualifies as OER-enabled pedagogy, we apply the four-part test listed above:

**1. Are students asked to create new artifacts (essays, poems, videos, songs, etc.) or revise / remix existing OER?**

Yes. New artifacts were created.

**2. Does the new artifact have value beyond supporting the learning of its author?**

Yes. The artifacts were meant to also support the learning of other students.

**3. Are students invited to publicly share their new artifacts or revised / remixed OER?**

Yes, students were invited to publicly share their creations, which are available online.

**4. Are students invited to openly license their new artifacts or revised / remixed OER?**

Yes.

Based on the answers to these questions, this approach clearly qualifies as OER-enabled pedagogy.

A second example from this genre comes from Jhangiani (2017), who also describes using OER-enabled pedagogy to facilitate the learning of current students while potentially improving the learning of future students. Over the course of a semester, he asked students taking a Social Psychology class to create test questions based on the material they were learning. Jhangiani felt that having his students write well-crafted questions (including plausible distractors) would help them attain a deeper level of understanding; moreover, it would help create a test bank for the open textbook that was being used in the course (and did not have an associated test bank). Jhangiani's class of 35 students wrote 1,400 questions throughout the semester. While Jhangiani did not consider the resulting test bank to be sufficiently polished to be used by other instructors, it provides a base that can be modified and improved on by future students.

Again, to examine the extent to which this approach qualifies as OER-enabled pedagogy, let us apply the four-part test listed above:

**1. Are students asked to create new artifacts (essays, poems, videos, songs, etc.) or revise / remix existing OER?**

Yes. New artifacts were created based on existing OER, namely a test bank.

**2. Does the new artifact have value beyond supporting the learning of its author?**

Yes. The questions provide formative, self-check opportunities for other students in the class and, perhaps eventually, other students.

**3. Are students invited to publicly share their new artifacts or revised / remixed OER?**

Not yet. The questions were available to class members but deemed not yet ready for public consumption.

**4. Are students invited to openly license their new artifacts or revised / remixed OER?**

Jhangiani does not report on this.

Because students were adding value to a pre-existing OER, if we assume that their resulting work was openly licensed, this approach would qualify as OER-enabled pedagogy.



**OER-enabled pedagogy and worked examples.** In his meta-meta-analysis of a range of educational practices, Hattie (2009) identified worked examples as an educational intervention associated with strong improvements in student learning. Worked examples provide students with step-by-step templates of how to complete tasks or solve problems and are particularly prevalent in math. Figure 1 provides an example of a worked example of a trigonometry problem (Ctcleung, 2014).

#### Determining the Measure of an Angle in a Triangle

Ex. 1: Point O is the centre of a circle and AB is a tangent to the circle. In  $\triangle OAB$ ,  $\angle AOB = 58^\circ$   
Determine the measure of  $\angle OBA$ .

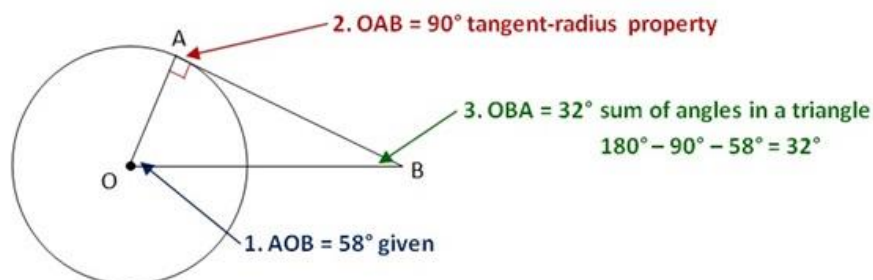


Figure 1. A sample worked example.

Through an OER-enabled pedagogy approach, students might create or modify openly licensed worked examples, specifically in topics that have proven troublesome to students in past semesters. This approach benefits students who create the worked examples, as creating the worked problems expands and deepens their knowledge. Moreover, it is beneficial for future students who can use these worked examples to help them process difficult topics in future semesters. In evaluating this approach, we find the following answers to the four-part test described above:

**1. Are students asked to create new artifacts (essays, poems, videos, songs, etc.) or revise / remix existing OER?**

Yes. These worked examples could be independent of pre-existing resources, or be built to align with OER, or could include revisions and remixes of existing worked examples.

**2. Does the new artifact have value beyond supporting the learning of its author?**

Yes. Worked examples can support the learning of future students.

**3. Are students invited to publicly share their new artifacts or revised / remixed OER?**

Yes, these works could be posted online.

**4. Are students invited to openly license their new artifacts or revised / remixed OER?**

Yes. Doing so would allow for the worked examples to be used in other contexts.

Because students would be creating new learning material (possibly connected with pre-existing OER), the first criterion is met. If we assume that their resulting work is openly licensed and publicly available, then this technique would be OER-enabled pedagogy.

***OER-enabled pedagogy and student summaries.*** Another way that students could generate resources that would both demonstrate their learning and help future generations of learners is to create summaries of key concepts related to a course. For example, in an English course in which students are studying *A Tale of Two Cities*, students could produce written or video-based presentations that summarize key historical context or important aspects of the storyline. Such summaries could include identifying symbolism or making connections between events of the book and contemporary society. These summaries could be both used and improved upon by future generations of learners. The answers to the four-part test for this approach are the same as the previous example.

***OER-enabled pedagogy and new contexts.*** One challenge all learners face is the transferring knowledge from one context to another. For example, a student may know that the earth revolves around the sun, but may struggle to understand whether this rotation influences the appearance of the moon in the night sky. Students could be assigned to take a principle or concept taught in class and concretely explain it in another context. Such an approach would benefit both current and future learners. The answers to the four-part test for this approach are the same as the previous example.

***OER-enabled pedagogy that results in primary course resources such as textbooks.*** Another broad category of OER-enabled pedagogy approaches concern the creation or revision/remixing of learning resources. For example, Robin DeRosa of Plymouth State University became concerned about the high cost of the textbook in the course she was teaching (DeRosa, 2016). In this American literature class, the majority of the texts that comprised her textbook were in the public domain, which made it seem incongruent to require students to purchase a textbook that cost nearly \$100.00.

Working with students she hired, DeRosa (2016) set about creating a basic open access anthology for her students. However, her students were somewhat dismayed at the lack of contextual introductions to each text in the anthology, as introductions are typically included in traditional textbooks and provide important background information. As part of the course, students created these introductions throughout the class, generally submitting them prior to the text being covered in class, and often revised after class. Student made other helpful edits to the anthology, such as modernizing spelling and creating videos, discussion questions, and other assignments that were related to the primary texts.

In evaluating this potential approach using the four-part test, we find the following:

**1. Are students asked to create new artifacts (essays, poems, videos, songs, etc.) or revise / remix existing OER?**

Yes. Students were involved in both collating, organizing and creating OER.

**2. Does the new artifact have value beyond supporting the learning of its author?**

Yes. The anthology will be of value to future students and other interested in the topic.

**3. Are students invited to publicly share their new artifacts or revised / remixed OER?**

Yes.

**4. Are students invited to openly license their new artifacts or revised / remixed OER?**

Yes, they were integrated into the learning materials.

This example is a clear (and some would say classic) example of OER-enabled pedagogy.

Another example of this general category is the textbook *Project Management for Instructional Designers* (described in Randall, Johnson, West, & Wiley, 2013). This book came about when David Wiley was teaching a course on this topic and found that there was no suitable textbook available. However, there was a pre-existing, openly licensed textbook on project management that Wiley was able to collaboratively revise with his students (as part of their coursework) to create a version specifically for instructional designers. They did so by adding examples relevant to educational technology, integrating new video case studies they produced, and making other changes that further improved the book for educational technology students. Students in future iterations of the course made further revisions and remixes. An analysis of this example is similar to the previous one.

**OER-enabled pedagogy and Wikipedia.** Another category of OER-enabled pedagogy is connected with Wikipedia. The basic idea behind many of these approaches is that a major assignment that students complete is writing or rewriting Wikipedia articles. One classic example of this type of pedagogy comes from a class titled “Murder, Madness & Mayhem.” Beasley-Murray (n.d.) was teaching a course at the University of British Columbia that focused on Latin American literary texts. He assigned students to edit (and if necessary create) Wikipedia articles about each of the texts covered in class. Beasley-Murray felt that this project would be important because it had “tangible and public, if not necessarily permanent, effects” (para. 9) in contrast with a final essay or exam which would be “written in haste; for one particular reader, the professor; and thereafter discarded” (para. 9). Another advantage of this assignment was that it motivated students to “re-read and reflect upon their own work” (para. 10). As Wikipedia requires sources for its entries, students were pushed to make sure that they were properly using prior research. Moreover, there were many people (besides the professor) reading their work and ensuring accuracy. Ultimately, 12 articles were created as part of this class; three of them achieved “featured article” status and eight achieved “good article” status (at the time, fewer than .5% of Wikipedia articles achieved either of these statuses).

Other examples of this type of OER-enabled pedagogy are plentiful. Azzam et al. (2016) taught classes to fourth year medical students over a two-year period in which editing Wikipedia articles related to medicine was the primary purpose of the class. In this class, 43 students made a total of 1,528 edits and added 274 references (and deleted several lower-quality references). These 43 articles were viewed over one million

times, indicating a significant contribution to society. In examining these Wikipedia-related examples using the four-part test described above, we find the following:

**1. Are students asked to create new artifacts (essays, poems, videos, songs, etc.) or revise / remix existing OER?**

Yes. The nature of the assignment is the creation or modification of OER.

**2. Does the new artifact have value beyond supporting the learning of its author?**

Yes. Wikipedia articles are viewed by millions of people each month.

**3. Are students invited to publicly share their new artifacts or revised / remixed OER?**

Yes. By definition, Wikipedia articles are publicly shared.

**4. Are students invited to openly license their new artifacts or revised / remixed OER?**

Yes. By definition, Wikipedia articles are openly licensed.

This is an excellent example of OER-enabled pedagogy - it would not have been possible or practical if the only available encyclopedias were copyrighted.

## Further Research Needed

Several years ago, Ehlers (2011) identified a need for research to determine the efficacy of OER. At that time some believed that, because OER are free of cost, they are necessarily inferior to commercial alternatives and that students who use OER would learn less. Conversely, some argued that open textbooks would dramatically improve student learning as students gained greater access to learning resources. Six years later, there have been more than a dozen studies, most of which have found OER to have a small positive impact on learning (Hilton, 2016). Will widespread adoption of OER-enabled pedagogy spark dramatic improvements in learning? We need more use of renewable assignments and other OER-enabled pedagogies, as well as more research, to answer this question. For example, a study might examine the question how much additional benefit is gained from the various criteria associated with OER-enabled pedagogy? For example, consider the following questions:

- Do students assigned to create, revise, or remix artifacts find these assignments more valuable, interesting, motivating, or rewarding than other forms of assessment? Why or why not?
- Do students who make their assignments publicly available demonstrate greater mastery of learning outcomes or show more enthusiasm for their work than students assigned traditional assessments? Why or why not?

- Do students who openly license their work find additional learning benefits? Does openly licensed student work produce additional benefits to the broader community?
- Are there any drawbacks (real or perceived) that are voiced by students or faculty that participate in OER-enabled pedagogy?

Those who study these questions need to carefully consider the metrics they use when determining whether OER-enabled pedagogy leads to increased learning outcomes. In what ways would we expect OER-enabled pedagogy to make a difference in student learning? Much of the OER efficacy research done to date focuses on GPA, pass rates, and other traditional metrics. These might be appropriate for measuring the influence of adopting OER-enabled pedagogy; however, there may be better metrics. For example, OER-enabled pedagogy could conceivably lead to changes in student creativity, enthusiasm, satisfaction, and other outcomes sometimes labeled “deeper learning.” Pre-existing and new instruments could be used to measure gains or losses in these areas.

## Conclusion

In the early days of OER adoption, research found that there are ways of adopting OER that actually cost more than using commercial materials. For example, Wiley, Hilton, Ellington, and Hall (2012) illustrate how a poorly planned print-on-demand strategy can make OER more expensive than publisher textbooks. Just as researchers spent time in the early years of OER adoption research specifically investigating the whether-or-nots and hows of cost savings, we need to spend time in these early years of researching OER-enabled pedagogy specifically investigating the value students and faculty find in doing this work, how motivating or engaging they find it, and how it can be improved.

Students are the authors and copyright holders of the homework and other artifacts they create as part of their education. There is no morally or ethically appropriate scenario in which faculty can *require* students to openly license their homework or other creations as part of an assignment. Caution is especially important when working with students who are minors. However, faculty can espouse the benefits of openness and appropriately advocate for students to license their works under a Creative Commons license. This advocacy will be more effective if the faculty member is using OER in the class and can point to OER they have created and shared.

Powerful examples of OER-enabled pedagogy will give faculty specific and direct reasons to adopt OER. As faculty come to understand that OER allows for the benefits of open pedagogy, the adoption of OER will significantly accelerate. This accelerated adoption of OER will, in turn, significantly increase the quality (through OER-enabled pedagogy) and affordability (through cost savings) of education for learners everywhere.

## References

- Azzam, A., Bresler, D., Leon, A., Maggio, L., Whitaker, E., Heilman, J. ... McCue, J. (2017). Why medical schools should embrace Wikipedia: Final-Year medical student contributions to Wikipedia articles for academic credit at one school. *Academic Medicine*, 92(2), 194.
- Beasley-Murray, J. (n.d.). Was introducing Wikipedia to the classroom an act of madness leading only to mayhem if not murder? Retrieved from <https://en.wikipedia.org/wiki/User:Jbmurray/Madness>
- Ctleung. (2014). A geometry worked-example demonstrating the tangent-radius property. Retrieved from [https://en.wikipedia.org/wiki/Worked-example\\_effect#/media/File:Worked\\_Example.jpg](https://en.wikipedia.org/wiki/Worked-example_effect#/media/File:Worked_Example.jpg)
- Cronin, C. (2017). Openness and praxis: exploring the use of open educational practices in higher education. *The International Review of Research in Open and Distributed Learning*, 18(5). DOI: <http://dx.doi.org/10.19173/irrodl.v18i5.3096>
- Daniel, J. (2004). From the triangle to the pentagon: Open universities in the 21st century. *Commonwealth of Learning*, 2-9. Retrieved from <http://hdl.handle.net/11599/1446>
- Day, R., Ker P., Mackintosh W., McGreal R., Stacey P., & Taylor J. (2011). Open education resources (OER) for assessment and credit for students project: Towards a logic model and plan for action. Technology Enhanced Knowledge Research Institute, Athabasca University. Retrieved from [https://auspace.athabascau.ca/bitstream/handle/2149/3039/Report\\_OACS-FinalVersion.pdf](https://auspace.athabascau.ca/bitstream/handle/2149/3039/Report_OACS-FinalVersion.pdf)
- DuFeu, B. (1992, January). Pour une pedagogie ouverte (For an Open Pedagogy). *Francais dans le Monde*, 246, 39-45.
- DeRosa, R. (2016). My open textbook: Pedagogy and practice. Retrieved from <http://robinderosa.net/uncategorized/my-open-textbook-pedagogy-and-practice/>
- Ehlers, U.-D. (2011). Extending the territory: From open educational resources to open educational practices. *Journal of Open, Flexible, and Distance Learning*, 15(2). Retrieved from <http://www.jofdl.nz/index.php/JOFDL/article/view/64>
- Elliott, J. (1973). Is instruction outmoded? *Cambridge Journal of Education*, 3(3), 169-181. doi:10.1080/0305764730030305
- Hattie, J. A. (2009). *Visible learning: A synthesis of over 800 meta analyses relating to achievement*. New York, NY: Routledge.
- Hegarty, B. (2015). Attributes of open pedagogy: A model for using open educational resources. *Educational Technology*, (July – August), 3 – 13.

- Hilton, J. (2016). Open educational resources and college textbook choices: a review of research on efficacy and perceptions. *Educational Technology Research and Development*, 64(4), 573-590. doi: <https://doi.org/10.1007/s11423-016-9434-9>
- Hodgkinson-Williams, C., & Gray, E. (2009). [Degrees of openness: The emergence of open educational resources at the University of Cape Town](#). *International Journal of Education and Development Using Information and Communication Technology*, 5(5), 101-116.
- Jhangiani, R. (2017) Why have students answer questions when they can write them? Retrieved from <http://thatpsychprof.com/why-have-students-answer-questions-when-they-can-write-them/>
- Mai, R. P. (1978). Open education: From ideology to orthodoxy. *Peabody Journal of Education*, 55(3), 231-237. doi:10.1080/01619567809538192
- Open Educational Quality Initiative. (2011). Beyond OER: Shifting the focus to open educational practices. *The 2011 OPAL Report*. Retrieved from [http://duepublico.uni-duisburg-essen.de/servlets/DerivateServlet/Derivate-25907/OPALReport2011\\_Beyond\\_OER.pdf](http://duepublico.uni-duisburg-essen.de/servlets/DerivateServlet/Derivate-25907/OPALReport2011_Beyond_OER.pdf)
- Papert, S. (1991). Situating constructionism. In S. Papert & I. Harel (Eds.), *Constructionism* (pp. 1-11). New York, NY: Ablex Publishing. Retrieved from <http://www.papert.org/articles/SituatingConstructionism.html>
- Pomerantz, J., & Peek, R. (2016). Fifty shades of open. *First Monday*, 21(5). DOI: <https://doi.org/10.5210/fm.v21i5.6360>
- Randall, D. L., Johnson, J. C., West, R.E., & Wiley, D.A. (2013). Teaching, doing and sharing project management: The development of an instructional design project management textbook. *Educational Technology*, 53(6), 24-28.
- Weller, M. (2013). The battle for open - a perspective. *Journal of Interactive Media in Education*, 2013(3), Art. 15. doi: <http://doi.org/10.5334/2013-15>
- Wiley, D. (2013). What is open pedagogy? Retrieved from <https://opencontent.org/blog/archives/2975>
- Wiley, D. (n.d.). Defining the “open” in open content and open educational resources. Retrieved from <http://opencontent.org/definition/>
- Wiley, D., Hilton, III, J., Ellington, S., & Hall, T. (2012). A preliminary examination of the cost savings and learning impacts of using open textbooks in middle and high school science classes. *International Review of Research in Open and Distance Learning*, 13(3), 262-276. Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/1153/2256>
- Wiley, D., Webb, A., Weston, S., & Tonks, D. (2017). A preliminary exploration of the relationships between student-created OER, sustainability, and student success. *The International Review of Research in Open and Distributed Learning*, 18(4).

doi:<http://dx.doi.org/10.19173/irrodl.v18i4.3022>

