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Guide to the Use of Open Educational Resources in K-12 and Postsecondary Education

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About SIIA

The Software & Information Industry Association (SIIA) is the principal trade association for the software and digital content industry. SIIA provides global services in government relations, business development, corporate education, and intellectual property protection to more than 700 leading software and information companies. SIIA's Education Division serves and represents some 200 developers of digital content, software applications, online learning, and related technologies used in elementary, secondary, and postsecondary education. SIIA member companies invest many millions of dollars each year to research, develop, and deploy innovative educational technologies. The SIIA Education Division shapes and supports the industry by providing leadership, advocacy, business development opportunities, and critical market information. SIIA provides a neutral business forum for its members to understand business models, technological advancements, market trends, and best practices. SIIA and our member companies have long collaborated with educators, policymakers, and other stakeholders to improve education through the use of innovative learning technologies. Contact: Mark Schneiderman, SIIA Senior Director of Education Policy, marks@siia.net / 202-289-7442.

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SIIA's Perspective on Open Educational Resources (OER)

[*NOTE: SIIA's Perspective is the opinion of SIIA and does not necessarily reflect the views of the authors*.]

The Software & Information Industry Association (SIIA) and our member companies are committed to improving teaching and learning through the effective use of educational technologies and digital learning. SIIA views open educational resources (OER) as one of many appropriate models for the development and distribution of content needed to meet the needs of students and educators. SIIA's OER agenda (and this Guide) is focused on helping all stakeholders better understand the benefits, challenges, and total costs to consider in determining the appropriate model for developing and implementing educational resources. SIIA expects that future educational needs will be addressed by a mix of instructional materials, including OER, and that there is a critical, though perhaps evolving role for commercial partners and proprietary models.

This paper will attempt to inform discussion and help answer many important questions about OER definitions, quality, sustainability, total cost of development, and implementation, among others. It is informed by decades of experience of the authors, SIIA, and SIIA member companies in partnering with education stakeholders to address the vast, varied, and evolving needs for educational resources and technologies. It was also informed by feedback from organizations that advocate for the use of OER. SIIA hopes this paper will help lead to sound educational resource policies needed to meet educational needs moving forward.

Some SIIA members develop OER and/or integrate them into their platforms and learning applications, while others develop, support, and use open source software. Most SIIA members and digital resource publishers employ a commercial license to distribute their content and applications. SIIA members invest many millions of dollars each year to research, develop, and deploy innovative educational content and technologies. They have extensive experience in not only developing a wide range of educational resources, but also in supporting their distribution, effective use, and ongoing improvement.

SIIA is pleased that educators and students are increasingly looking to technology and digital resources. Policymakers need to recognize that digital is more than print on a screen or flat, digitized text and images. Digital enables the redesign and transformation of textbooks and instructional materials to be more robust, interactive, and personalized; and digital includes multi-media, simulations, online courses, adaptive tutorial courseware, and serious learning games.

SIIA recognizes that interest in OER among government agencies and education decision makers, as well as many non-profit entities and foundations, appears driven largely by the goals of reducing costs, improving access, providing quality, and supporting educator/student customization of their content. SIIA urges the community of OER investors (e.g., legislators and education officials) and users to consider the following:

- Even in an age of common learning standards, the need to personalize learning will continue to require a robust choice of curricular resources – proprietary and OER – and related technology tools and services. Investments by government authorities or other organizations based on the assumption they can simply 'build it once' could inappropriately limit options. No single resource or set of resources will be sufficient to meet the wide range of educational needs.

- The principles of academic freedom and personalization of learning require that government agencies and educational institutions continue to support educational choice. They should not in

the future limit the use of funds to only the development/adoption of OER, but instead should continue ensuring grant and other funding for acquisition/implementation of any and all resources that meet the particular educational need, whether OER or proprietary.

- To meet diverse and evolving educational needs, the nation's education sector demands an environment that encourages R&D investment – public and private, for-profit and non-profit – to ensure ever more innovative and effective resources. Education leaders should strive for a sector that encourages investment and competition, provides resource choice, and rewards innovation.

- Educational resources, including OER, require not only the initial investment, but as importantly must budget for the total, long-term cost of development and use. These ongoing and recurring costs include user training/support, as well as content hosting and maintenance, content updates, and technology updates that, according to some SIIA members, can often require as much as an additional 20% annual cost.

- When making cost-benefit calculations and comparisons, it is important to consider these total initial and ongoing costs of development and adoption. Comparisons require both short-term and long-term factors, as well as recognition of both individual use and systemic impact.

- Institutional, local, or state adoptions of content should use the same review standards, criteria, and process when the content is of the same or similar type – e.g., core, supplemental, etc. – no matter whether OER, commercial or other license.

- To the degree that public funds are invested in the development of (open) educational resources, they are best targeted to address gaps where quality resources are not currently available to meet educational needs. In addition, such public investments should consider the benefits of public-private partnerships or related models that ensure an ongoing user commitment and a recurring revenue stream needed to update, support, and sustain the resource over time.

- To the degree that government funds are invested in the development of OER, those resources should be available through a CC BY license allowing third parties to revise, reuse, remix and redistribute the resource, including commercially. An NC license – prohibiting others from using the work for commercial purposes – would be counter to the public policy goal of leveraging public funds to have the widest impact on innovation, cost-savings, access, and diversity of resources. [Added April, 2013]

While SIIA recognizes that content development/delivery models will continue to evolve, SIIA encourages education leaders to recognize that the shift from print to digital and the use of OER does not mean that one-time investments and single-source solutions are sufficient. In contrast, SIIA sees the need for models that ensure continued investment, R&D and choice. SIIA looks forward to working further with all stakeholders to consider the opportunities and challenges of OER and other ways to ensure the availability of ever more innovative, effective, and diverse resources to meet evolving educational needs.

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Table of Contents

- Copyright and Copyright License
- Free and Open-License
- Open Educational Resources
- Creative Commons (CC) Licenses and OER
- Free Use and Commercialization of OER
- OER Formats
- OER Sources
- A Brief Note about MOOCs

- Implementing Educational Resources
- Elements of Resource Development, Maintenance, and Support

- Sponsorship & Advertising
- Membership Fees
- Freemium / Premium
- Aggregation and Custom Services
- Customer Communities
- Platform Licensing
- Grants and Community Donations
- Support from Benefactors

- Government Overview
- U.S. Federal Government Activity
- State Government Activity
- International Activity
- Foundation and Organizational Activity
- OER Initiatives

1. Are all OER free, and are all free educational resources considered OER?
2. Can educators modify and remix publisher content, or only OER?
3. Are Open Educational Resources quality resources?
4. At the K-12 district level, what are the required resources for using OER as core instruction?
5. At the post-secondary level, what are the additional resources needed for using OER?
6. Are OER cost-effective? Do they represent good value?
7. Are OER current and constantly updated?
8. Are teachers / professors interested and trained in creating educational resources, and remixing resources provided by publishers, colleagues, etc?
9. Do OER have a role in personalized learning?
10. What potential new opportunities and challenges are created for publishers by the federal government's open licensing requirements for content created through certain educational grants?
11. What potential impact will OER have on the publishing business?
12. What is the projected growth trajectory for OER?

Preface

This white paper was developed under the guidance of the SIIA Education Division's working group on Open Education Resources (OER). It is intended to provide a clearer understanding of what defines an OER, and offer general guidance on the most frequently asked questions about OER. While OER use is broader than in schools and colleges, this paper focuses on their use, impact, and implications in formal institutional settings. This document also looks at the broader and more challenging questions around OER – how they are sustainable and what the Total Cost of Ownership (TCO) is for educational agencies or institutions that seek to scale their use. In addition, this paper highlights several federal and state government OER initiatives, touching on the evolving public policy issues. We have also included a roundup of the various business models currently in practice to create, sustain, and leverage open and free content. For publishers and developers, this paper highlights why they need to be aware of open resources as they consider the future of their products, services and organizations. Within the worlds of OER, instructional content, and learning technologies, pedagogy, use-cases, and business models (among other things) are changing rapidly. Business models are evolving; instructors and content developers are innovating. Due to the pace of development of OER, readers should be aware that the evolution of the industry may quickly move beyond some of the information included in this document.

Acknowledgements

SIIA extends its thanks and appreciation to all those individuals and organizations who helped ensure this SIIA Guide to the Use of Open Educational Resources in K-12 and Postsecondary Education is accurate, relevant, and informative to key stakeholders.

We are especially grateful for the tireless efforts and quality work of the authors, Sue Collins and Peter Levy. Their knowledge and commitment to excellence made this document possible.

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Introduction

Increased access to and advances in technology, the demands of digitally native students, and virtual educational opportunities are increasingly driving the educational system to address teaching and learning needs using technology and digital learning, including the adoption of digital content. At the same time, tight education budgets have forced K-12 and higher education leaders to adopt a mantra of "doing more with less." Given these educational goals and fiscal conditions, it is understandable that stakeholders at every level would be attracted to open educational resources (OER). OER are defined as "teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others."[1] [Source: Hewlett Foundation]

Institutions, government agencies, non-profits, foundations and educators themselves are investing their time and resources to fund and/or develop OER. Educational leaders and practitioners are adopting OER and evaluating the effectiveness of OER in meeting their needs. Stakeholders are examining many questions, including the impact on traditional content providers such as commercial publishers, educational quality, as well as the resource requirements to implement, scale, and sustain OER over time as compared to resources currently spent for traditional content.
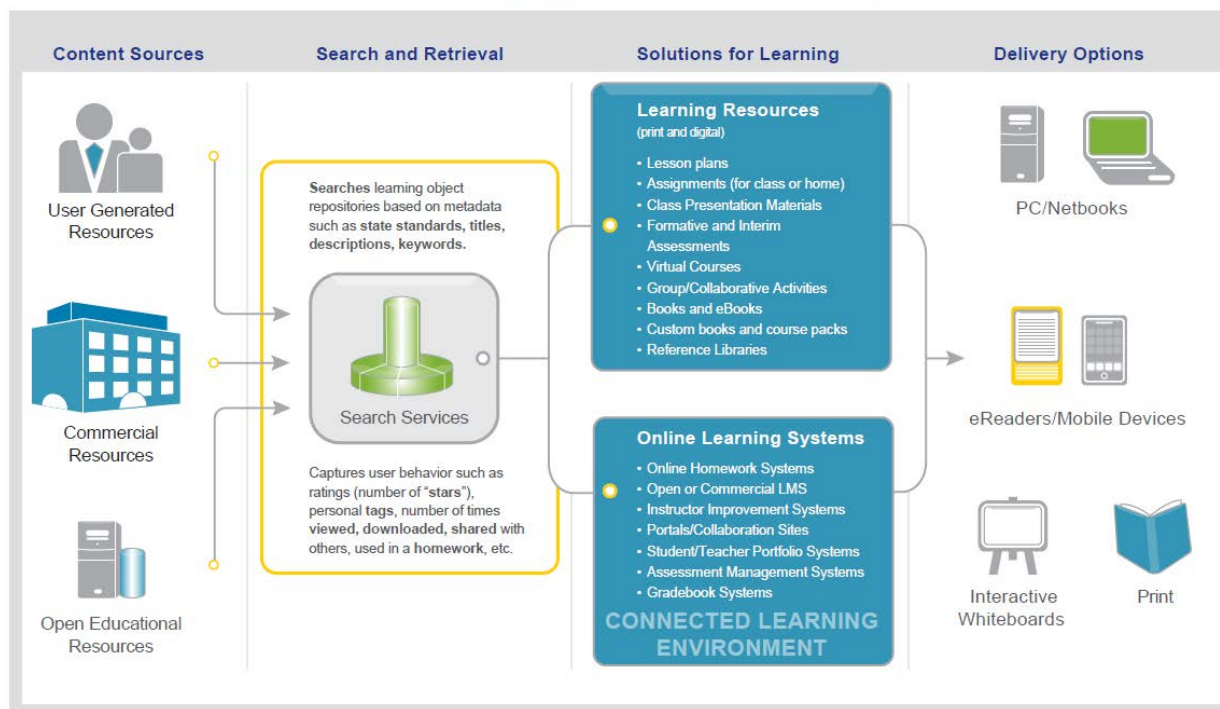
Permission granted courtesy of Pearson, from "Learning Matters: A New Ecosystem of Educational Resources," January 2010.

The adoption of digital learning and digital content is increasing throughout K-12 and higher education. A myriad of blended models are emerging, using a mix of print and digital, OER and commercial, online and face-to-face. Today, digital resources are not only flat, digitized text and images, but also more robust, interactive, and multi-media resources – including simulations, online courses, adaptive tutorial courseware, and serious learning games. These resources – along with online learning, sophisticated

assessment and data systems, and flexible practices – are enabling a shift from a more batch-process industrial model of instruction to personalized learning that supports more customization for students.

A number of factors have come together to drive the use of OER in the United States. These include intense pressure on state and institutional budgets, increased societal and academia support for educational collaboration and access, technology advances that facilitate sharing online content, interest in content customization, and the world-wide acceptance of the Creative Commons as a legal framework for sharing intellectual property. In higher education, the cost of textbooks has created a market opportunity for emerging for-profit entrants using OER to create whole new business models. In K-12, the coming Common Core State Standards for English Language Arts and Mathematics may also create unprecedented economies of scale for the development of instructional material that might further drive adoption of aligned OER.

OER Defined

Open Educational Resources (OER) come in many shapes and sizes, are developed and supported under a range of operational models, and are used under a variety of license options. This variation cannot be understated. The following is a more detailed look at the elements of licensing, the precise definitions of OER and its components, and the wide variability within the licensing schema.

Copyright and Copyright License:

The issues of copyright and license are often confused but are fundamental to understanding OER.

- *Copyright* is the body of exclusive rights granted by the laws of a particular nation to the owners of original works of authorship to protect those works as their property. With some exceptions such as for *fair use*, copyright laws generally default to a requirement that users must be granted permission from the owner before modifying or redistributing his or her work.

- A *copyright license* is a means by which a copyright holder can authorize third parties (en masse or individually) to use that copyrighted intellectual property according to the terms of that license.

Free and Open-License:

Many confuse educational resources that are simply free with those that are open.

- *Free* resources allow use of the content at no cost, but do not necessarily allow the user to modify, remix, or redistribute the content. That is in part because copyright carries the presumed tag-line "all rights reserved." The Internet provides access to millions of such free resources.

- *Open-licensed* content gives users more than just the right to use the resource as is at no cost. An open license also provides a variety of rights to (in most cases) remix, revise, reuse, and redistribute the works, including the rights to create derivative works and share the content (both in its original form and in the derivative work) with others. Content shared by its copyright owner under an open license carries a moniker of "some rights reserved." OER generally follow the same logic as open source software, which makes the underlying code freely available for the community to use and modify.

Open Educational Resources:

As noted above, the most widely accepted explanation of Open Educational Resources defines them this way:

> *"OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use <u>and</u> re-purposing by others."* [Source: <u>Hewlett Foundation</u>]

OER assume free (i.e., no acquisition fee) access to the resources and free (i.e., no royalty or license fee) permission to engage in the "4R" activities when using them. Users of OER have the rights to:
- Revise: adapt and improve the OER so they better meets your needs;
- Reuse: use the original or your new version of the OER in a wide range of contexts;
- Remix: combine or "mashup" the OER with other OER to produce new materials; and
- Redistribute: make copies and share the original OER, or your new version, with others.

Creative Commons (CC) Licenses and OER:

Open Educational Resources are made available under a range of licenses. The most widely adopted are the Creative Commons (CC) licenses, developed by the non-profit group Creative Commons. In recent years, the interest among educators and others in sharing resources helped drive development and broad adoption of the CC licenses, which have become the standard licenses for OER. OER authors/owners maintain their copyright, but use the CC or other open licenses to authorize third parties en masse to use their copyrighted works according to the terms of that license.

Appendix A offers a detailed breakdown of the six specific versions of Creative Commons licenses and the rights associated with each. All require attribution (i.e., citation or BY) to the original author at their core, while the licenses vary in their permission of modifications/derivatives as well as commercialization.

It is important to note that certain CC licenses are *not* considered consistent with the principles of OER, notably those licenses that do not allow for derivatives (i.e., CC BY-ND and CC BY-NC-ND).

In addition to the Creative Commons licenses, content that has fallen out of copyright or content that is initially released as Public Domain is also OER, because public domain resources are available at no-cost and users have the legal rights to reuse, revise, remix, and redistribute them. Unlike materials released under Creative Commons licenses, content from Public Domain materials do not require attribution and are free from all copyright restrictions.

Some OER providers have released their content under their own custom licenses that, while not Creative Commons, still permit certain similar rights to use and share. Any author/copyright holder can create a custom license, including one that follows the OER tenets, providing for a virtually unlimited number. Most OER authors and users, however, use the CC licenses, because they provide a relatively simple, uniform, and globally accepted standard. Creative Commons formed in 2001 and is in the process of releasing version 4 of its licenses.

Free Use and Commercialization of OER:

While OER are free, some CC licenses (e.g., CC BY) nevertheless still allow commercialization. In these cases, the original resource is free, but anyone can commercialize the resource as long as they maintain

the attribution to the original author. It is worth noting that while some open licenses allow for commercialization of derivative works, those derivative works may no longer be considered OER if a user must pay a fee to acquire them and/or is not allowed to reuse, revise, remix and redistribute them. Users must also confer with the specific site's Terms of Service to ensure that such commercialization is not expressly prohibited.

Like open resources, a number of commercial providers and other content creators allow their users to modify content and create derivative works. In these cases, the specific license may, for example, allow for distribution within an instructor's individual class or institution. This is an important model for allowing educators and students to customize content to their needs, while also providing a business model that sustains the ongoing development and support of content creation.

OER Formats:

Open Educational Resources can be as large and comprehensive as a course or textbook (including one enhanced with images, multimedia, and assessments), or as small as an image, video clip, or worksheet. OER can take virtually all formats, including print, audio, images, video, animation, and other types of instructional content, though they are most often thought of as digital and online to support ease of collaborative authoring and sharing. The Hewlett Foundation defines OER to include: "full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge."

OER Sources:

Open content comes from a range of sources. Non-profits and foundations, governments, for-profit companies, and teachers and professors (individually and in groups) have all contributed to the breadth of resources currently available. Open Educational Resources are a global phenomenon and have to date seen wider adoption outside the United States than within. In the United States, postsecondary education has seen the most impact from the open resource movement, although the influence of OER in elementary and secondary education appears to be growing rapidly.

A Brief Note About MOOCs:

A discussion of OER definitions and variations would seem incomplete today without a brief mention of Massively Open Online Courses (MOOCs). Notably, the "open" for most MOOCs refers primarily to open enrollment, rather than open licensing. In other words, in most cases, anyone may participate in a MOOC at no cost (though MOOCs are still considering revenue models), but if the MOOC is not openly licensed, no one may download, remix, revise, reuse, or redistribute the MOOC course (though there are cases where MOOCs are starting to provide these rights).

Total Cost of Development / Total Cost of Ownership

Implementing Educational Resources:

Educational resources, both OER and proprietary, provide varied levels of scale, scope, quality, license rights, support, and other features. Whether there is an initial acquisition cost (for commercial resources) or whether that cost is zero (for OER), those deciding what resources to use should recognize their total costs of development (TCD) and their total cost of ownership (TCO).

A wide range of core and value-added elements may be needed to support the effective implementation of *any* educational resource. In addition to basic content authoring, these may include standards alignment, accessibility for students with disabilities, rendering for various technology platforms, educator training, content updates, and more. These features can be addressed at various stages of the creation / implementation cycle, and by various constituencies. If these features are not included as part of the initial development (by the commercial publisher or OER author), then this work and the related expense may need to be addressed by the implementing entity (i.e., school district, agency, institution, or instructor).

When an individual teacher or professor makes a decision to *use* OER to support his or her courses, the costs (in terms of time and money) of using that OER may be minimal or even free. However, when whole K-12 schools, districts, or colleges attempt to scale the use of OER as primary learning content, as with any resource, administrators should be aware of the total cost of ownership (TCO) that *can* be associated with broadly adopting resources at scale. These costs *can* often include tasks that might otherwise be assumed to be part of the resource development process.

For those schools, institutions, and agencies choosing to support the *development* of OER or other content, the costs include the time faculty spend developing the content. In addition, resources may also be needed for video and interactive development, technology maintenance, and content upgrades over time. All of this can be thought of as the total costs of development (TCD).

Elements of Resource Development, Maintenance, and Support:

The development and ongoing delivery of any quality educational resource, commercial or OER, includes many tasks that fall into three major categories: initial resource development, implementation and technology maintenance, and content or design upgrades.

Initial Resource Development: Content development can include both the basic task of researching, designing, and authoring an educational resource, as well as value-added tasks that educators may find valuable. Some of these costs are more unique to K-12 education than postsecondary. Specifically, value-added tasks may include:
- **Metadata Tags.** Allow for content to be found by user search and be portable across platforms, and enables analytics to determine which resources are most effective.
- **Accessibility/ Universal Design.** Resources may also be needed to make the content fully accessible to students with disabilities.
- **Standards/Course Alignment.** This includes local, state, and Common Core State Standards, as well as various types of assessments.
- **Check for Bias:** Content needs to be editorially reviewed to ensure that it is free of bias and fair in its treatment of religion, ethnicity, race, and sexual orientation.
- **Efficacy-based research:** Resource development needs to be based on proven and effective instructional strategies. Often, demonstrated efficacy is required through evaluation studies.
- **Assessments:** Formative, interim, and summative assessment items and scoring rubrics may be included to support core curricula.
- **Multiple Versions:** Maintaining multiple versions for a variety of browsers, operating systems (OS) and devices (including legacy versions). Resource development should take into account the work and cost of ensuring that the resource displays properly on a wide variety of devices and technologies and provides backward compatibility.

Implementation and Technology Maintenance: Implementation issues for K-12 and higher education institutions are both technical and instructional, and include:

- **Training and Professional Development.** In K-12, as with any new curriculum, the district will need to engage in professional development to ensure that teachers are comfortable with the material. Teacher support resources and services include teacher guides, training materials, and professional development. In higher education, implementation may include product training and technical support, including working with individual faculty members, the bookstore, the library, or other instructional materials centers. If the resources are OER, instructors may need to be further trained on how to edit and remix the content.
- **Technology Updates.** Updates to take advantage of increased functionality of new technologies, including maintaining multiple versions for a variety of new browsers, OS, and devices (including legacy versions).
- **Maintenance & Integration**. Providing ongoing maintenance of the digital resources, including confirmation of active hyperlinks, availability of third-party content, and error corrections.
- **Integration & Support**. Installation and integration with the user's learning management system or platform, including providing technical support to users.

Content and Design Upgrades: Once the content is initially adopted and implemented, additional resources may be needed to manage, update, and maintain the content so that it remains accurate and up-to-date. Requirements here may include:
- **Content Modifications**. Updates may be needed to reflect content that has changed (e.g., Pluto as a planet) or to adjust to changes in standards of learning or course requirements (e.g., in K-12, introduction of or changes to the new Common Core State Standards).
- **Instructional Design**. Changes may be needed to reflect new cognitive and pedagogical research on how best to teach a subject, as well as updates for new technologies and technical standards (e.g., the addition of evolving metadata to facilitate analytics on which resources are most effective).

Educational decision makers should consider all of these above factors in making a cost-benefit analysis of which instructional resources to develop or adopt, regardless of the scale of their deployment. This analysis should include Initial Resource Development, Implementation and Technology Maintenance, and ongoing Content and Design upgrades to fully understand the true, long-term costs.

Business Models

When compared to the traditional print (and even digital) publishing model, the Open Educational Resource movement is still in its infancy. Given this fact, the range of business models currently being used can largely be seen as a set of pilots. Many OER initiatives, both now and in the future, will likely use a combination of models to make their efforts sustainable.

The key questions for today's education leaders, authors, and developers are:
- What are the implications of OER on future business models needed to develop, deliver, support, and sustain educational content?
- How might content authors and commercial publishers need to evolve their products and pricing to differentiate from, and/or provide value-added services on top of, OER?
- What sustainability models are needed to develop, deliver, support, and maintain OER?
- What "business friendly" open licenses (e.g., CC BY) and related public policies and grant requirements are appropriate to enable commercial providers to collaborate with OER authors and leverage OER?

The following is a roundup of several models currently in use by OER initiatives, or by other entities that leverage OER in their products and services. The examples also address the implications and opportunities for providers – educational or non-governmental; for-profit or non-profit – seeking models that provide sufficient revenues to support and sustain their products, services, and enterprises.

Sponsorship & Advertising: Although many educators are concerned about their students being exposed to sponsor messages and advertising, the current economy is making this option more palatable for some schools. Content providers who are able to aggregate substantial audiences may be able to include sponsorship of their sites as part of their revenue mix. Sponsorships can potentially be sold on a homepage or throughout a site, or may be focused only on certain interior pages such as those that include content in certain subject areas or that match to highly targeted campaigns. Curriki, for example, is experimenting with this model.

Membership Fees: Content can be offered on a tiered system, adjusting the terms of who may access it or what they may access. One model provides free access to individual teachers or students, but charges a membership fee for use by an institution, which also receives some additional functionality. An example of this model is the Monterey Institute, which allows individual teachers and students free access to learning resources through HippoCampus, but institutions pay an annual membership fee for full access to complete courses and other value added services for their entire school. Included with the membership fee are "premium items" such as student assessments, teacher's guides, student's guides, and other material. In addition to receiving the additional benefits, those paying the fee are making a financial commitment to ensure the continuation and success of what otherwise they (or at least their teachers) could receive for free. Over time, one might expect those paying a fee will exercise increasing influence over the operations and content development decisions, perhaps resulting in a resource development cooperative or aggregated purchasing consortium.

Freemium/Premium: This model offers some content at no cost and then charges for additional content or services that provide additional value. Flat World Knowledge took on perhaps the highest profile of any organization pioneering this model. As a provider of peer-reviewed college textbooks written by subject matter experts, Flat World allows individual professors to edit and annotate the books and customize them to their courses. Initially, the company made the books available for free as online resources, and charged for other formats (e.g., print, audio, ePub, etc.) and study aids. In late 2012 the company announced that they were moving to a fee model for online access as well, and explained that the company's long-term sustainability required the change.

Others, however, continue to combine the freemium/premium model, often with support from grants or other benefactors. BetterLesson, for example, allows free access to curricular content on the site to all users, but charges districts for a range of premium services, including customer support tools, professional learning communities, and more sophisticated analytics. BetterLesson now reports having hundreds of paying customers, including the KIPP charter school network along with smaller networks such as Uncommon Schools, Rocketship Public Schools, Achievement First and Friendship Public Charter Schools. BetterLesson has blended the Freemium/Premium Model with additional support from non-profit grants, such as a recent $3.5M grant from the Bill and Melinda Gates Foundation.

Aggregation and Custom Services: As discussed elsewhere, a sea of curriculum materials is of limited value unless it is organized into a cohesive package. The Web offers millions of resources, many with educational value and at no cost. Given the potential price pressure on publishers who sell content products that educators may increasingly view as commodities, forward-looking providers may consider thinking more holistically about their relationships with their clients.

Pearson, the world's largest educational publisher, announced a new post-secondary initiative called Project BlueSky in November 2012. The product is a platform for users to search for OER and blend them seamlessly with other proprietary Pearson offerings. By providing a tool to search OER and then integrating their own for-fee products into the mix, Pearson appears to be acknowledging the growing number of college level educators who are choosing to use OER. Similar products are also emerging in the K-12 space, including Learning.com's Marketplace and Pearson's Online Learning Exchange (OLE).

The coming age of customization presents an opportunity for all content providers – as well as content aggregators, assessment providers, and learning management systems – to work directly with K-20 educators and institutions in an ongoing consultative relationship to help develop truly customized offerings. In this model, the provider works with the institution to conduct a needs assessment and then assembles a customized curriculum built with a mix of existing open and proprietary content, depending on the needs of the client. Service providers may even offer to develop a customized curriculum by modifying either their own proprietary content or content available freely under an appropriate open source license. Included with a set of services might also be ongoing formative assessments, related professional development, etc. Based on the results of which resources are found to be most effective, the provider may then recommend modifications to the scope and sequence. Given their long-standing knowledge and breadth of expertise, coupled with their well-established customer relationships, publishers may have a distinct advantage in this new market.

Customer Community: Although not a model tied to direct revenue, communities where users can share open resources that support proprietary software have been developed by several publishers. For example, Key Curriculum Press, now a part of McGraw-Hill, launched the Sketch Exchange in support of the company's product *The Geometer's Sketchpad*. The site allows users to share sketches that work on the company's software, along with videos, lesson plans and other best-practices. The site also features a forum for users to further discuss using the software. While the site generates no direct revenue, company leaders believe it further cements an already loyal user base, fosters company loyalty, and will ultimately result in high levels of upgrades as new versions of the software are released. Similar efforts exist from Texas Instruments and Inspiration Software.

Platform Licensing: For OER initiatives that have developed a platform for the delivery of their open content, opportunities exist to license that platform either to publishers, schools districts or postsecondary institutions to develop their own content. These platform licenses could also be combined with professional services for customized implementations.

Grants and Community Donations: Most OER organizations are funded by grants from non-profits, government agencies, and foundations, along with donations from the community. Wikipedia and Khan Academy, along with several others, use this donations model. The Gates and Hewlett foundations have been primary funders of OER. (See below for more examples of foundation and government grants.) In addition to cash contributions, in-kind donations can take the form of non-monetary contributions of curricular resources from an external source (e.g., a high-tech company), or the donation of services that would otherwise need to be paid for by the OER provider – for example, back-end support for the coding or even online hosting for the resource.

Support from Benefactors: Curriki was initially funded predominantly by a benefactor, the family foundation of Scott McNealy, founder of Sun Microsystems. McNealy's vision, however, has always been to provide the seed capital to launch and advance a K-12 OER, and then transition the site to being self-sustaining. FreeReading, an early open source reading program from Wireless Generation, also follows the benefactor model. As the company's web site states, FreeReading "provides an alternative so that schools and districts can redirect textbook funds to other valuable, highly-impactful components of

education." Whether those options include professional development, technology, formative assessment, or something else, FreeReading provides an opportunity for districts to rethink the return on their education investment dollars.

Government & Non-Profit Activities

Government Overview:

The interest in OER among policymakers and government leaders, as well as educational agencies and institutions, appears driven largely by the goals of reducing costs (for students and government), improving access to (digital) educational resources, improving educational resources' innovation and quality, and supporting educator/student customization of their content. Some public officials have also identified the ancillary goal of reducing costs for content developers, including commercial publishers, but also other OER developers.

Public policies have taken the following basic forms (though some examples below fall outside these models):

- Government direct funding of OER development, most likely via RFP and contracted to a third party author, whereby the agency funds the development of specific educational resources and requires that the content be delivered under a Creative Commons or other open license. This allows the agency to modify and share the content without further licensing fees or restriction from the author.

- Government indirect funding of OER development by grants to educational agencies or institutions, non-profits, and/or for-profit organizations, whereby grantees are required to make resources created with public grant funds – to the extent any such resources are created with the grant funds – available under an open license.

The impact of OER, and of related public policies, in addressing those goals remains an open question. This section will not review the results of these policies, but will instead outline a variety of government legislative initiatives and regulations. A comprehensive directory of government OER policies and programs is available at the Creative Commons OER Policy Registry.[2]

U.S. Federal Government Activity:

The federal government has some history in developing educational resources under the first model above – direct funding of free, public domain educational content – but has expanded aggressively to the other policy model under the Obama Administration. These policies appear motivated by the goals of improving student access to education, leveraging federal investments to have impact beyond the grantee, and creating economies of scale by supporting development of educational resources that can be modified and enhanced by others.

The Obama Administration's views are reflected in the U.S. Department of Education's 2010 **National Education Technology Plan**[3], which recommended that the federal government:

"Support the development and use of open educational resources to promote innovative and creative opportunities for all learners and accelerate the development and adoption of new open technology-based learning tools and courses."(Rec. 4.3) [It further called for the government to:] Expand the availability of digital-learning content, resources, courses, and tools and ensure their

continuous improvement by funding the research and development of open educational resources. [Finally, the plan also notes the importance that policy] ". . . facilitate states working together to pool resources for identifying and evaluating or issuing requirements for developing open educational resources."

The U.S. Department of Education's **Supplemental Priorities for Discretionary Grant Programs include:**

"Priority 16—Improving Productivity. Projects that are designed to significantly increase efficiency in the use of time, staff, money, or other resources while improving student learning or other educational outcomes (i.e., outcome per unit of resource). Such projects may include innovative and sustainable uses of technology, modification of school schedules and teacher compensation systems, use of open educational resources (as defined in this notice), or other strategies. . . . Open educational resources (OER) means teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or repurposing by others."[4]

The Obama Administration's first significant statement on OER was the 2009 proposal (as part of the American Graduation Initiative (AGI))[5] for $500 million toward development of open, online courses. According to U.S. Secretary of Education Arne Duncan, "Such an open-source, easily accessible system of robust courses will produce the most profound equalization of access to cutting-edge knowledge and information since the creation of the public library."[6]

As passed by the U.S. House of Representatives, Section 505(a) of H.R.3221 read: "Open Online Education- . . . the Secretary is authorized to make competitive grants to, or enter into contracts with, institutions of higher education, philanthropic organizations, and other appropriate entities to develop, evaluate, and disseminate freely-available high-quality online courses, including instructional materials, for training and postsecondary education readiness and success."[7]

While the AGI was not approved by Congress, the open course provision was included by the Obama Administration in a key component of the U.S. Department of Labor's (DoL) **Trade Adjustment Assistance Community College and Career Training Grants (TAACCCT) Program**, funded in 2010 for a total of $2 billion over four years. The first two rounds of grants were awarded in the Fall of 2011 and 2012. TAACCCT will "provide community colleges and other eligible institutions of higher education with funds to expand and improve their ability to deliver education and career training programs."[8] To the degree that grant funds are used for creating or acquiring learning materials, all learning materials developed using grant funds must be released under the Creative Commons Attribution (CC BY) license.

Further, and more specifically, grantees must meet the following three requirements[9]:

1. "License to the public (not including the Federal Government) all work created with the support of the grant ("Work") under a Creative Commons Attribution 3.0 License ("License"). This License allows subsequent users to copy, distribute, transmit and adapt the copyrighted work and requires such users to attribute the work in the manner specified by the Grantee."

2. "The government reserves a paid-up, nonexclusive and irrevocable license to reproduce, publish, or otherwise use, and to authorize others to use for Federal purposes: i) the copyright in all products developed under the grant, including products developed through a subcontract

under the grant; and ii) any rights of copyright to which the grantee, or a contractor purchases ownership under an award (including but not limited to curricula, training models, technical assistance products, and any related materials). Such uses include, but are not limited to, the right to modify and distribute such products worldwide by any means, electronically or otherwise."

3. "The grantee may not use federal funds to pay any royalty or license fee for use of a copyrighted work, or the cost of acquiring by purchase a copyright in a work, where the Department has a license or rights of free use in such work."

This language required that all content created as part of these programs must be made available as OER and for federal government use. Subsequently, in response to questions raised, a modified FAQ issued by the DoL made clear that:

"Only work that is developed by the grantee with grant funds is required to be licensed under the Creative Commons license. Pre-existing copyrighted materials licensed or purchased by the grantee are subject to the intellectual property rights the grantee receives under the terms of the particular license or purchase. Additionally, works created by the grantee without grant funds do not fall under the Creative Commons license requirement."[10]

The Obama Administration has continually signaled its interest in OER and has identified a priority around the future development of OERs in several U.S. Department of Education (USED) programs:

- Race to the Top (RTTT): The RTTT program (as well as the RTTT Assessment (RTTA) program) includes the following requirement of grantees:

    "Unless otherwise protected by law or agreement as proprietary information, the State and its subgrantees must make any work (e.g., materials, tools, processes, systems) developed under its grant freely available to others, including but not limited to by posting the work on a Web site identified or sponsored by the Department."[11]

While the RTTT program provides no further specific guidance, there is relevant RTTA program guidance. For example, the RTTA guidance includes the following points:

- "Absent an agreement, the contractors that produce works for a consortium will retain copyright ownership in those works. Therefore, if the consortium wants to retain any of the aforementioned usage rights in procured works from contractors, the consortium should make sure there is appropriate contract language that grants the consortium those usage rights. . . .

- Absent any applicable agreement or contract, the right to make derivative works remains with the original author of the copyrighted work. If the consortium or its contractors, using their own funds, create derivatives of works created with RTTA funds during or after the grant period, neither Program Requirement 6 nor 34 CFR § 80.34 will apply to the derivative works."

In short, while the requirement is less than clear, it appears that the federal government allows the use of RTTT and RTTA funds for the development or licensing of proprietary technology, but wherever

possible calls for grantee agreements with contractors that allow for grant deliverables to be made freely available (though not necessarily open licensed) to others.

- Investing in Innovation (i3): The i3 program allows grantees to copyright intellectual property produced with grant funds, but provides USED with a "non-exclusive and irrevocable license to reproduce, publish, or otherwise use those project materials *for government purposes*"[12] under 34 CFR § 80.34. This requirement is also part of RTTA (which the language below references).

  On the one hand, the RTTA guidance (presumably applicable for i3 as well) requires that:

    - "The Department reserves a royalty-free, nonexclusive, and irrevocable license to reproduce, publish, or otherwise use, and to authorize others to use, for *Federal* government purposes, the copyright in any work developed under a grant (or contract under a grant) in this program, and any rights of copyright to which a grantee or contractor purchases ownership with grant support."

    - The "[CONTENT PROVIDER] acknowledges that it must make any assessment content (i.e., assessments and assessment items) developed under this Agreement freely available to states, technology platform providers, and others that request said content for purposes of administering assessments.

  On the other hand, this law allows that:

    - The "[CONTENT PROVIDER] will not be required to make any assessment content available to other parties if the assessment content is protected by law or agreement as proprietary information."

    - "Any content developed by [CONTENT PROVIDER] prior to the development of work under this Agreement is not subject to the Department's license. However, any prior content merged with content developed under this Agreement is subject to the Department's license."

  So again, it appears that the default is for "freely available," but that such a requirement can be negated by the terms of a contract, thus leaving the decision up to the grantee and the willingness of the provider to agree to the grantee's terms.

- Ready to Learn (RtL) and Ready to Teach (RtT): These two grants for the development of educational and professional development programs/content include an invitational priority (one of only three total funding priorities) for:

  "Applications that provide for the development and dissemination of products and results through open educational resources (OER). OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or repurposing by others."[13]

In contrast, many federal grant programs, such as those funded through the National Science Foundation (NSF) and the Small Business Innovation Research (SBIR) program, have historically put a premium on commercialization as an appropriate model to best leverage public funding to scale and sustain an

educational resource. This model still exists, but is perhaps being replaced program-by-program by the more open requirements.

State Government Activity:

State policymakers' support for OER appears driven by a narrower set of goals – primarily reducing costs for educational institutions and improving student access to educational resources. One belief is that public funds would go directly for access (i.e., devices, network, Internet connectivity, etc.), while many content needs can be addressed through free and/or open resources.

California.

- In 2009, Governor Arnold Schwarzenegger announced the Free Digital Textbook Initiative as an "important step toward embracing a more interactive learning environment . . . to meet the changing academic needs."[14] The state does not fund development or implementation, but has simply invited any content developer to submit free materials for state approval. Phase one of the Digital Textbook Initiative consisted of flat and linear free textbooks in high school math and science. No Creative Commons or similar license was required, only that the resource be made available at no cost. Twenty books were included from a variety of non-profit and commercial providers. Phase two added additional subjects and courses, allowing publishers to submit ePub files, but still limiting "books" to essentially PDFs of textbooks that didn't include hyperlinks, multi-media or any of the other enhancements that digital books can offer. Phase three, which wrapped up in December 2010, expanded to include online, interactive resources, both open source and commercial digital textbooks that were all available for free. According to the California Learning Resource Network (CLRN)[15], the majority of the resources reviewed during phases one and two had Creative Commons licenses that allow for download, adaptation, and republishing. Some phase three interactive textbooks were from commercial publishers and did not include a CC license.

- In September 2012, Governor Brown signed into law a program to fund development of free open source college textbooks and make them available to students and faculty in a state-created digital library. SB 1052[16] provides for the selection, development, and administration of the free open digital textbooks for the most popular lower-division courses overseen by the establishment of the "California Open Education Resources Council" (COERC). The Council is comprised of faculty members from the University of California, California State University, and Community Colleges, and is charged, in part, with determining which courses merit inclusion. SB 1053[17] creates the California Open Source Digital Library to house the open source textbooks and courseware. The digital open source textbooks and related courseware will be crafted through a competitive RFP process open to faculty, publishers, and others and made available under the Creative Commons Attribution license (CC BY). The legislation provides $5 million in state funding, but requires matching funds from a non-governmental source. It also requires that print copies of the open textbooks be made available to students for about $20 per copy.

New York. In a 2012 RFP for Curriculum Modules and Statewide Professional Development for New York State English Language Arts & Literacy and Mathematics (RFP #SA-03)[18], the New York State Education Department includes the requirement that the content be released under a Creative Commons non-commercial license. Other state curriculum grants, including RFP #SA-08 for the development of virtual AP courses, have encouraged the development of content as OER, but not required such licensing.

Texas. The 2009 Texas Open-Source Textbook Initiative (HB 2488)[19] was driven by the goal of reducing costs and providing additional online resources for school districts. It includes two components:

- Provides the State Board of Education (SBOE) the authority to acquire open-source textbooks for secondary-level courses. The OER were limited to those submitted by faculty from certain Texas public universities. Interestingly, this component did not require a traditional review and adoption process, instead automatically adopting resources that meet the few eligibility criteria (e.g., author, subject/grade and license).

- Authorizes the Commissioner of Education to request state-developed open-source instructional materials through a Request for Proposal (RFP). It required the state agency to carry out a competitive process to "purchase state-developed open-source textbooks."

     [As defined by statute,] "an open-source textbook is an electronic textbook that is available for downloading from the Internet at no charge to a student and without requiring the purchase of an unlock code, membership, or other access or use charge, except for a charge to order an optional printed copy of all or part of the textbook."

     [According to the state RFP,] "A state-developed open-source textbook must be irrevocably owned by or licensed by the state, and the state must have unlimited authority to modify, delete, combine and/or add content to the textbook after purchase…The COE [i.e., Commissioner] shall provide a license to each public school in the state, including a school district, and open enrollment charter school, and a state or local agency educating students in any grade from prekindergarten through high school, to use and reproduce a state-developed open source textbook."[20]

Under the state licensing agreement, school districts would have the option to customize the state-developed open-source content to meet the needs of their students. According to TEA, to date, open-source instructional materials have not yet been made available through either process.

Utah. In January 2012, the Utah State Office of Education announced that it would develop, support and encourage the use of open textbooks for secondary language arts, mathematics, and science courses.[21] The math and science books are OER that were originally published by the CK-12 Foundation, while the Language Arts books will be produced locally. The Hewlett Foundation is providing partial funding. Curriculum will be written by teaches and other experts and vetted by peers. The books will be made available online for free access, downloading, and use by anyone, and printed through an on-demand service at a cost of about $5 per book. State leaders indicate goals of reducing costs and providing timely content updates.

Virginia. The 21st Century Physics Flexbook[22] project was initiated in 2008 by, among others, former Obama Administration CTO Aneesh Chopra. It was launched in response to concerns that state-approved physics books were not sufficiently current and accurate. Thirteen K-12 physics teachers, along with industry and university faculty, volunteered to author the OER through the CK-12 FlexBook platform. The OER was intended to supplement, not replace, the existing textbooks. Access is free, and the resources can be copied and then modified by users. The state does not appear to have continued to support the supplementary OER initiative, although the resources are still available. However, the current McDonnell Administration recently put out a call for scientists, engineers, and other practitioners "to collaborate with the National Aeronautics and Space Administration (NASA) and the CK-12 Foundation on the development of a new modeling and simulation FlexBook."[23]

Washington. There are two initiatives of note in Washington:

- A 2012 law (HB 2337) directs the Superintendent of Public Instruction (OSPI) to support the state's K-12 schools in adopting open educational resources (OER) aligned with state and Common Core curricular standards.[24] This includes providing professional development on the creation, use, and continuous improvement of open courseware. The program aims to reduce costs of, and improve access to, a wide array of content. Specifically, the program will develop a library of openly licensed courseware by adopting and adapting existing high-quality openly licensed K-12 courseware from either nonprofit or for-profit organizations. The resources would be available to school districts free of charge to use, distribute, and create derivative works. The program is dependent upon the availability of appropriate funds. School districts may, but are not required to, use any of the openly licensed courseware.

- The governor-appointed State Board for Community and Technical Colleges (SBCTC), which administers the state's system of 34 public two-year colleges, has advanced several OER initiatives. In 2010, it passed a resolution that all digital software, educational resources, and knowledge produced through competitive grants, offered through and/or managed by the SBCTC, must carry a Creative Commons Attribution License.[25] This policy applies to all funding sources (state, federal, foundation, and other) that flow through SBCTC. The Board is also developing an Open Course Library for the state's 82 highest enrolled courses, the first 40 of which have already been released, with others expected later in 2013.[26] The Washington State Legislature funded development of these resources, with a $750,000 matching grant from the Gates Foundation. Each course was developed and peer reviewed by a team of instructors, instructional designers, and librarians. Use of the course materials is optional. All the materials will be openly licensed so those in Washington and elsewhere can freely access, modify, and use them.

International Activity:

OER is a global movement more advanced in many other countries than it is in the United States. While this document is focused on U.S. activity, a few examples are provided here as a sample of international initiatives.

Poland: The Digital School Pilot seeks to raise ICT competence.[27] The program is scheduled to run from April 2012 through August of 2013 and will provide 380 schools with hardware (including tablet computers) for their grade 4-6 classrooms. The program also allocates $14M USD specifically for the development of free digital textbooks, all licensed under a Creative Commons Attribution license. This is the major initiative in Poland that funds the development of OER.

Brazil: In Brazil, the legislature in State of São Paulo recently approved PL 989/2011, which ensured that all educational resources developed or purchased with government funds must be made available under an open copyright license.[28] While the legislation had broad support, it was vetoed by the Governor because of a perceived conflict of powers between the Executive and the Legislative branches. Local OER advocates say they are pursuing other avenues to achieve a similar result.

South Africa: In 2002, South Africa's Shuttleworth Foundation announced the launch of the Free High School Science Text (FHSST) initiative. Over the course of 5 years, volunteers developed comprehensive, free, and open science and mathematics textbooks for Grades 10 to 12 science learners in South Africa. Now run through an organization called the Siyavula Project, the course offerings also include free and open texts for natural sciences and technology in grades 4-6.[29] In 2012, the Department of Basic Education in South Africa distributed 2.5 million printed textbooks (based on the FHSST books) to

learners throughout the country. Siyavula also recently announced that they had ported their textbooks to a platform called Mxit, the most popular chat client for WAP-enabled phones in South Africa. This provides access to nearly 100% of the target demographic.

British Columbia, Canada: The British Columbia (Canada) government announced in October, 2012 that it will fund the creation of open textbooks (CC BY license) for the 40 most popular first- and second-year courses in the province's public post-secondary system, serving some 200,000 students. The first resources could be available in 2013. The explicit purpose is to reduce student expenses by providing free online (or low-cost print) materials that replace textbooks that students would otherwise be required to purchase. The B.C. government is enlisting BCcampus to run the B.C. Open Textbook Project.[30] BCcampus – a publicly funded collaborative information technology organization serving the higher-education system – will do so by engaging B.C. faculty, institutions, and publishers through an open request for proposals. The materials will be available on the BCcampus Shareable Online Learning Resources repository (SOL*R). The policy does not require faculty to use these open resources.

The Organization for Economic Cooperation and Development: OECD is considering an initiative to express and enable the commitment of OECD member countries to freely share, by electronic means, all learning, training, and educational materials produced or paid for by their respective governments for public use with others around the world. The OECD Education Policy Committee (EDPC) is working towards the development of an OECD Recommendation on OER.[31] The policy objective of the proposed OECD Council Recommendation is that countries develop policies that promote the production, access, sharing, use, and re-use of OER. The organization cites the economic and social benefits of better access to high-quality learning resources, higher cost-efficiency, and more flexible educational opportunities for learners as the motivation behind the policy recommendation.

Foundation and Organizational Activity

Foundation support comes in two forms. Some grant-making foundations, such as Hewlett and Gates, provide funds for third parties to develop resources that are released under a Creative Commons license. Other action foundations, such as the Saylor Foundation, themselves develop OER materials. Here is a brief overview of the activities of some of the key foundations in the OER movement:

Grant Making Foundations:

The William and Flora Hewlett Foundation: The Hewlett Foundation is among the first and most significant foundations which support OER. Since 2002, Hewlett has directly supported development of OER, while recent work has focused on "establishing a self-sustaining and adaptive global OER ecosystem and demonstrating its potential to improve teaching and learning." A search for OER in their grants database[32] produces 57 grants in K-12 and postsecondary education since 2005, including grants to Achieve, the International Association of K-12 Online Learning (iNACOL), Creative Commons, Institute for the Study of Knowledge Management in Education, Open University, and the OpenCourseWare Consortium.

The Bill & Melinda Gates Foundation: The Gates Foundation has not necessarily focused on OER, but it has required many grantees to make their grant-funded resources available through an open license.[33] For example, the Gates Foundation has provided:
- $30 million in Next Generation Learning Challenges (NGLC) grants in support of 78 secondary and postsecondary education organizations since its inception in 2010. The grants are focused on improving college readiness and completion through technology and require that all content that is created with grant funds be released under a Creative Commons Attribution license.

- Funds to the Washington State Board for Community and Technical Colleges (SBCTC) Open Course Library of 82 high-enrollment courses, whereby all materials created through system grants are openly licensed.
- Grants that aim, in part, to support the use of OER. Examples include the Learning Resources Metadata Initiative (LRMI) grant to the Association of Educational Publishers (AEP) and Creative Commons, as well as the Shared Learning Infrastructure (SLI) (i.e., inBloom).
- $4 million to Khan Academy to develop additional K-12 math exercises to ensure full coverage of the Common Core math standards and form a small team to implement a blended learning model.

Action Foundations:

- CK-12 Foundation: The CK-12 Foundation provides open-source content and technology tools to help teachers provide learning opportunities for students globally. The Foundation seeks to provide free access to customizable educational content in a variety of modalities suited to multiple student learning styles and levels. CK-12 helps students and teachers alike by enabling rapid customization and experimentation of teaching and learning styles.

- Saylor Foundation: Since 2008, the non-profit Saylor Foundation has built over 270 free, self-paced, online courses as OER. The foundation hires credentialed professors to create course blueprints and to locate, vet, and organize OER materials into a structured and intuitive format. Each course culminates with a final exam, and students receiving a passing grade can download a certificate of completion. The foundation intends to add additional focus on the primary, secondary, and post-graduate levels in 2013.

- Twenty Million Minds Foundation: Their goal is to reduce the total cost of education and increase affordability, access, and student success. The foundation is focused on postsecondary education and also provides support to faculty in developing, customizing, and implementing these resources.

Organizational Support:

A number of influential organizations have also expressed support for the use of OER. These include Achieve, the State Educational Technology Directors Association (SETDA), the Southern Regional Education Board (SREB), the National Association of School Boards of Education (NASBE), the Counsel of Chief State School Officers (CCSSO), the National Governor's Association (NGA), and the International Association of K-12 Online Learning (iNACOL).

OER Initiatives:

OER initiatives are too numerous to list here, but the following are some of the most significant projects to illustrate the range of offerings:

- MIT Open Courseware
- OER Commons
- Connexions
- Merlot
- Carnegie Mellon Open Learning Initiative
- Open Yale Courses
- Community College Consortium for Open Educational Resources (CCCOER)
- Boundless
- Khan Academy
- Curriki

- HippoCampus (Monterey Institute for Technology and Education)
- CK-12
- OpenStax
- Open Courseware Consortium
- PhET

OER Frequently Asked Questions

A number of important questions continue to be raised by educators, policy makers, content developers, and other stakeholders that demonstrate ongoing lack of understanding about OER. The following set of frequently asked questions and answers is intended to help drive more understanding and discussion on these key issues, many of which are addressed in other formats elsewhere in this document.

1. **Question**: Are all OER free, and are all free educational resources considered OER?

   Answer: All OER are, by definition, free, but free educational resources are not always OER. OER are made available with a global open copyright license that enables any user to access the resource without a fee and to reuse, revise, remix, and redistribute the resource without paying a royalty. Not all free resources meet these OER criteria.

2. **Question**: Can educators modify and remix publisher content, or only OER?

   Answer: The ability for educators to modify or remix content depends *not* on the author, source, or cost, but instead on the terms of the licensing agreement. Some educational publishers are releasing commercial products that permit faculty and/or students to modify their proprietary content and integrate Open Educational Resources in with proprietary content. Educators must check the specific license terms of the resource in question to determine their rights to modify and remix the content. Finally, as noted above, just because content is made available with a CC license does not necessarily mean the content is OER or that it can be modified or remixed by users.

3. **Question**: Are Open Educational Resources quality resources?

   Answer: OER can run the gamut of quality just like proprietary content. OER should be subject to the same review standards, criteria, and process used for institutional, local, or state adoption of the same type of content. Core curricula should be evaluated based on the standard textbook adoption criteria. Supplementary OER content may be subject to less rigorous evaluation than core materials, but should be reviewed by the same standards as other supplemental materials. Quality criteria might include the resource's research base, instructional design and pedagogy, scope and sequence, accuracy, engagement of and adaptability to the learner, and efficacy. In assessing quality, OER, just like any instructional materials, need to be individually evaluated based on the intended educational use. A critical OER quality caveat relates to derivative works – even if the original content is developed and reviewed to ensure high quality, downstream derivatives may not be subject to the same processes and controls. In the same way, an open resource of only marginal quality can be improved by the OER community into a resource of high instructional value.

4. **Question:** At the K-12 level, what are the required additional resources needed to use OER as core instruction?

   Answer: The answer will vary depending upon the OER. For example, some OER are as comprehensive a traditional textbook, including a scope and sequence, full coverage of standards, assessments, an alignment to standards, a review for bias and appropriate reading level, etc., as well

as multi-media that extend the digitized text in some cases. Other OER include none, or only some, of these value-added features and quality assurances that publishers traditionally provide. If a district is looking to implement OER without these value-adds, or if a district is looking to assemble its own textbook or other units of study from available open content, it should be aware that this can require a range of additional resources. In other words, the initial savings in acquisition costs (i.e., from not having to pay for an open resource) may be offset to varying degrees by the later costs of the development, implementation, ongoing maintenance and support, and updates that are traditionally the responsibility of publishers.

5. **Question**: At the postsecondary level, what are the additional resources needed for the use of OER?

   Answer: The answer revolves around the individual OER and the intended application of the content. The decision at the postsecondary level to use OER can be made at the individual faculty level, the department level, or the institutional level. If an institution adopts a set of OER, then it is possible that the resources that normally accompany the adoption of a textbook will need to be provided by the institution or department, either through a purchase of supporting resources or by faculty development. These resources traditionally include: electronic test banks, electronic slides (for lecture), and other visuals or video.

6. **Question**: Are OER cost-effective? Do they represent good value?

   Answer: Assessing the value depends on the particulars of the situation. Regardless of whether the investment is made on the acquisition or the implementation costs, the value proposition can only be determined by the end users based on their specific requirements.

   For an individual educator or professor who wants to customize or supplement his or her courses, OER can provide editable content at no cost beyond the time it takes to find the resource. If the OER are used in place of purchased instructional materials, this may free up budget for the agency or institution – assuming the OER are of sufficient quality, etc. In cases where the quality, alignment, or other criteria are not met, an instructor may need or want to invest his or her time in making modifications and improvements. It is already common practice in higher education for professors and instructors to customize their course materials. If a professor selects OER for textbook replacement, the enrolled student's outlay for course materials may be reduced.

   When a district tries to scale an adoption of an OER system-wide in place of another core, comprehensive resource such as a traditional textbook, there can be many additional costs that the district would need to address. Historically, providers of curriculum resources have developed products based on an instructional design, scope, and sequence, and aligned to curriculum standards. In addition, they have reviewed their products for content accuracy, lack of bias, and editorial quality. In some cases, these services are provided by the OER, but in many cases they are not. School systems will have to budget in order to fill the gap, but may be able to shift dollars saved in curriculum acquisition to curriculum implementation. In such cases, OER may be seen by some as simply a cost-shifting mechanism whereby development (and its costs) shifts from the publisher to the teacher or others at the individual school or district level.

7. **Question:** Are OER current and constantly updated?

   Answer: Just as with content that is purchased from a publisher, the degree to which OER content is current and updated is dependent upon the model employed by the initial publisher or OER provider. Many OER providers feel the responsibility of keeping their content up to date. Others, once they

have released the content, feel that it is the responsibility of the community to provide the updates. In the latter case, this means when a popular revolution changes the leadership in Egypt or when Pluto loses its classification as a major planet, it would be left to the OER community to reflect this latest information. Building this kind of active and involved community, however, can be challenging; many OER sites have found that users are eager to use the content, but less likely to provide reviews or make updates or improvements. Once OER derivatives are created by users, the question of updates is again left to that author or future users of that resource.

8. **Question**: Are teachers/professors interested and trained in creating educational resources and remixing resources provided by publishers, colleagues, etc.?

   Answer: There are two questions here: (1) Are teachers/professors willing and able to be content authors, and (2) Are teachers/professors willing and able to modify content from other sources to meet their needs.

   In the case of teachers/professors being willing to be content authors, based on data compiled for this report, there is currently an active but small minority of K-12 teachers who are deeply engaged in content authoring to support the development of OER. Professors, who traditionally have been responsible for their courses instructional resources, are often more open to being authors and developers. This may translate to a greater willingness to consider using OER. At the same time, professors who have earned part of their income from book royalties on textbooks may therefore be resistant to OERs.

   In the case of teachers/professors being willing and able to use and modify content, it appears most likely that the vast majority of teachers/professors will assemble a blend of open and proprietary content and mix them to meet the specific needs of their students, rather than modifying existing content. To date, those in higher education are more inclined than those in K12 to adopt this mix of open and proprietary content. OER in K-12 is growing in both usage and in the numbers of teachers modifying and customizing it, but thus far there is significantly more usage of existing OER than there is modification.

9. **Question:** Does OER have a role in providing personalized learning?

    Answer: Personalized learning – customizing the learning experience and content for each student's unique needs and interests – can be supported through many types of content and educational resources. Personalization can be done by having access to item banks of content from which the teacher and student can draw, as well as from an adaptive instructional software application that provides multiple learning objects, lessons, modalities, etc. to address the same learning standard. Other educators prefer to be able to create multiple derivative versions of a single resource, which could include both OER and proprietary resources that permit modification by the user. This allows them to have all their students work with the same content, while at the same time having the content meet their individual learning needs. Publishers can, and often do, license their content to provide their educator customers with the rights and tools to make such modifications for their individual classroom use.

10. **Question**: What potential new opportunities and challenges are created for publishers by the federal government's open licensing requirements for content created through certain educational grants?

    Answer: While the Obama Administration has moved in an unprecedented fashion to require that many resources created with federal funding be released under an open content license, they have

done so in a manner that ensures those resources can be commercialized by third parties, including the for-profit publishing industry. For example, the Department of Labor's TAACCCT grant program is providing $2 billion over 4 years (2011-2014) mostly to community colleges to create career training programs (see above). All of the content created under this program is required to be released under a CC BY (i.e., attribution) license, which allows content and technology developers to use the grant deliverables as a part of their own commercial products and services, as long as they attribute the original author. The challenge for publishers is that the grant-funded OER materials may duplicate educational programs they have already developed, thus forcing them to compete with government-subsidized free resources. The potential opportunity for publishers is to develop efficient systems to leverage these newly created OER, such as including them in content repositories. While some may find significant value here, others may choose not to use this content in this way, because they believe that modifying OER to fit into their existing platforms and products will be more expensive than developing their own from scratch. In addition to repurposing the content, the Administration is encouraging publishers to adopt new business models based on value-added services that experienced publishers are uniquely qualified to provide. A final opportunity is that open modules developed with public funds to supplement a proprietary resource might drive users back to purchase the core, commercial resource.

11. **Question**: What potential impact will OER have on the publishing business?

    Answer: The longer-term consequences of OER on the publishing business will play out over the next several years. OER is more than a short-term phenomenon, but the long-term impact cannot be known since to date, OER adoption is modest in scale and duration. Should educator interest in open content continue to grow, publishers will need to follow and adapt to this trend to meet the budgetary and instructional needs of their customers. To date, the impact on sales is unclear. However, the recent economic downturn and slow recovery could be a tipping point for OER adoption. The wide adoption of open content may require organizations and publishers to think strategically about the products and services that they provide to the education market and perhaps offer a hybrid of proprietary and open content, including freemium and fee-for-service models that add value to, or support, free and open content.

    At the same time, there may be opportunities for publishers to distinguish their offerings and create higher-end resources with more research and development investment, more robust technology, customizable resources/content, professional development, and value-added services. Examples might include cognitive tutors with adaptive, interactive content, as well as software built on gaming principles and designs. In higher education, publishers may need to compete by making their books modifiable. Resources will also need to be sold to support the growing number of technology platforms, including tablets, e-books, and smartphones. New business models such as per-chapter downloads, short-term rentals, and online (per drink, consumption) subscription services may also further develop. In K-12, new opportunities to partner with schools and districts to vet, organize, and custom-publish using a blend of open and proprietary resources will likely also emerge.

12. What is the expected growth trajectory for OER over the next five years?

    According to Rob Reynolds, PhD, the author of the 2012 book The Future of Learning Content and the Director of MBS Direct Digital, a for-profit digital solutions platform[34]:

"…As we look at current projections around the popularity and market penetration of OERs and open textbooks in the US, we're really looking at two possible futures. In one future we will continue creating lots of open learning content in disconnected silos and without the necessary mechanisms for making it easy to adopt and use. In this future the use of OERs and open textbooks will continue to grow through 2015 but will decline precipitously after that point in time.
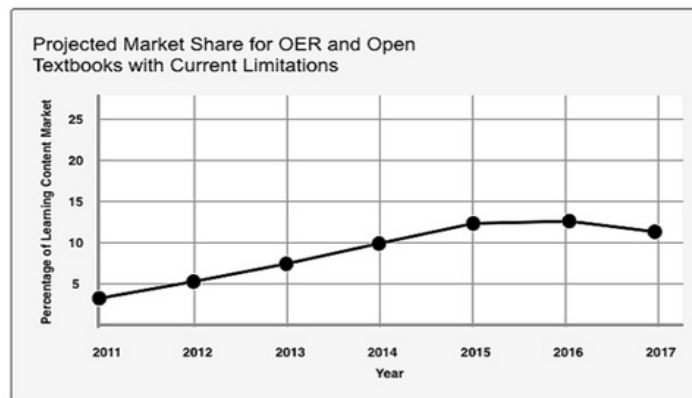
In an alternative future, we will invest in making open learning content as easy to discover and use as commercial learning content. The result of this investment will be continued and aggressive growth in the adoption and use of open learning content."
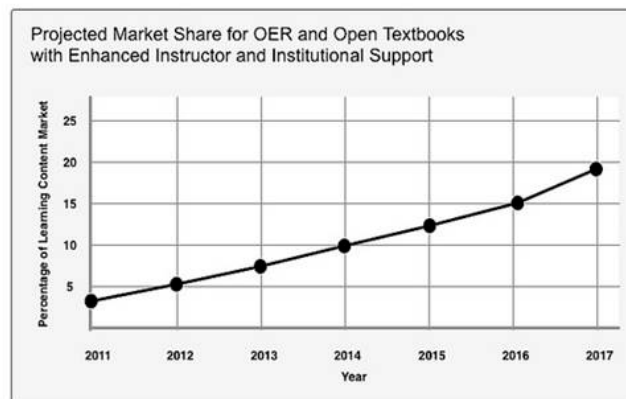
With the release of offerings from major for-profit publishers that facilitate the inclusion of OERs, broader adoption of OERs seems likely.

Summary

As our educational system moves increasingly digital and online, the development and adoption of open educational resources continues to grow. The factors behind that growth include perceived cost savings, enhanced technologies for authoring and sharing content online, interest in content flexibility and customization, and now the further economies of scale brought by the K-12 Common Core State Standards. While free initial acquisition and open licensing generally distinguish OER, many OER are unique in their scope, design, development process, user interface, and sustainability model. OER is not a one-size model, but rather a continuum and part of the evolution of digital educational content. As open educational resources become an increasingly significant factor in this environment, our policies, practices, and business models will need to continue to adjust.

As noted earlier, the use of OER is not without its potential pitfalls. Resources required to scale the use of OER can be considerable. Questions about accuracy, completeness, alignment to standards, and accessibility, among others, all must be addressed. As OER begins to mature, some contend that their use will end up as little more than cost shifting rather than cost savings. Others contend that after comparing the Total Cost of Ownership for OER and the Total Cost of Ownership of commercial content, and adding in the increased flexibility of OER, open resources will provide long-term value.

At the same time, awareness of and interest in open educational resources is growing rapidly. In addition to the extensive number of existing OER sites, new start-ups, both commercial and non-commercial, are also springing up. Several initiatives have been recently proposed to create and share a wealth of OER material aligned to the Common Core standards. Just as the Common Core State Standards are allowing states to collaborate on the development of common assessments, they also provide opportunities for various non-commercial organizations (i.e., government agencies, foundations, non-profits, etc.) to build digital content for use nationwide. This can create economies of scale not available when each state had its own learning standards.

Beyond the potential for cost savings, open resources represent a fundamental shift in the relationship between educators and their classroom materials. By taking a more active role in assembling and developing the curriculum, teachers get more engaged in the material. Evidence from a randomized controlled trial conducted for the research project, Transforming Instruction by Design in Earth Science (TIDES), showed that teachers who were involved in designing curriculum in some way had greater success teaching the unit, as measured by student achievement data. School districts that participated in the project reported positive outcomes because it prepares teachers to become critical consumers of curriculum materials (Penuel, 2009).[33] The same may be said of students who benefit from content creation and sharing.

Open resources also represent a change in the relationship between institutional consumers and the publishing industry. Commercial publishers need to ask themselves if OER is growing because the traditional publishing model isn't responsive to users' desire for flexibility and customization and/or because of cost. Whatever the cause, by working with open educational resources, educators are relying even less on publishers to provide a complete and finished work. Curricular materials therefore are transitioning from being a product to a process – one that educators continue to develop and refine on an ongoing and iterative basis. Publishers have an opportunity to be a part of this process in a variety of capacities. Educators have an opportunity to redefine the products and services they need from publishers, developers, and service providers, perhaps opening opportunities for further investments in, and purchase of, more advanced learning technologies as well as customized, value-added instructional supports.

It appears that OER and the related educational, business, and intellectual property license models are here to stay. In the end, the greatest value of OER may not be in cost-savings, but in changing the relationship of educators and students to their learning resources by empowering them to help author, customize, and share them. Either way, all stakeholders will need to carefully consider and appropriately adjust to OER as an important educational element. The coming years will provide many opportunities to help test the OER model and enable all education stakeholders to better answer the important questions regarding OER's educational and cost effectiveness and appropriate use.

Appendix A

OER Glossary

Attribution is the act of identifying the author, creator, publisher, and/or copyright owner of a work when it is used or appears in another work. Attribution is often considered the most basic of requirements made by a copyright license, as it credits an author and prevents others from claiming fraudulently to have produced the work. Attribution is often required in copyright licenses, and is required in all Creative Commons licenses.

Creative Commons Licenses are a suite of global open copyright licenses created and stewarded by Creative Commons, a U.S. nonprofit corporation founded in 2001. Creative Commons created these licenses as part of their work to increase the amount of creative works (cultural, educational, and scientific content) in "the commons" — the body of work that is available to the public for sharing, use, repurposing, and remixing. Creative Commons offers several different types of licenses – each with different terms and conditions -- that can be used by authors and copyright owners to license their works. These licenses offer simple and clear information about what other people can and cannot do with that work. The permissions and requirements for the six license types outlined by Creative Commons are defined below. "In the case of ShareAlike licenses, they apply to usage of the original work as well as any derivative works. Note that Creative Commons licenses were designed primarily for use with digital content, but not for software. Note also that the last two CC licenses in the chart below are not considered to be consistent with the principles of OER, because they do not allow for derivatives. See http://creativecommons.org/licenses/.

Attribution **CC BY**	This license lets others distribute, remix, edit, and build upon a work, including commercially, as long as they credit the author for the original creation. This is the most accommodating of the licenses offered. Because it allows the most flexibility in terms of creating and sharing collections of resources, CC BY is the license most often promoted by the open education community.
Attribution- **ShareAlike** **CC BY-SA**	This license lets others remix, edit, and build upon a work including for commercial purposes, as long as they credit the original author and license the new creations under the identical terms. This license is often compared to "copy left" free and open source software licenses. All new works will carry the same license, so any derivatives will also allow commercial use.
Attribution- **NonCommercial** **CC BY-NC**	This license lets others remix, edit, and build upon a work non-commercially, and although the new works must also acknowledge the original author and be non-commercial, it is not required that derivative works be licensed on the same terms.
Attribution- **NonCommercial-** **ShareAlike** **CC BY-NC-SA**	This license lets others remix, edit, and build upon a work non-commercially, as long as they credit the original author and license the new creations under the identical terms.

	This license allows for redistribution, commercial and non-commercial, as long as it is passed along unchanged and in whole, with credit to the original author.
Attribution-NoDerivs **CC BY-ND**	
Attribution-NonCommercial-NoDerivs **CC BY-NC-ND**	This license is the most restrictive of the six main licenses, only allowing others to download a work and share it with others as long as they credit the original author. The work cannot be changed in any way or used commercially.

Fair use is a doctrine in U.S. copyright law that allows certain limited uses of copyrighted material without requiring permission from, or compensation to, the rights holders, such as for commentary, criticism, news reporting, research, teaching, or scholarship. The fair use doctrine allows the legal, non-licensed use or incorporation of copyrighted material in another author's work, which could include a teacher or student. Whether a particular use may be considered to be a 'fair use' is determined by a four-factor balancing test, which asks: (1) What is the character of the use?; (2) What is the nature of the work to be used?; (3) How much of the work is being used?; and (4) What effect would this use have on the market for the original or for permissions if the use were widespread?

Freemium is coined from the words "free" and "premium." It describes a business model in which an organization gives away a core product or service for free – such as basic Web services or a basic downloadable digital product – and then generates revenue by selling premium products to users. In most freemium models, less than 10 percent of end users eventually buy something. With innovations in digital production and distribution via the Internet, companies are able to copy and distribute free products to a large group at minimal cost. This means they are able to create a viable business model from selling to only a small percentage of users. While Freemium is an increasingly popular business model, it has its detractors who say it is costly to support free users and more lucrative to focus resources exclusively on paying clients and those likely to become paying clients.

Open refers to the principle of openness with regard to content and other resources that allow users to change, use, duplicate, improve, and share the resource. "Open" does not mean "without limitations." In the system implemented by Creative Commons (widely thought to be representative of an "open" license), authors may stipulate that the use requires attribution, that it be non-commercial, that the derivative product be shared under the same license, or that it include other use restrictions.

Public domain refers to resources that are not protected by copyright law, including most works produced by the federal government or those for which copyright or patent has lapsed or expired. Works in the public domain generally may be freely reproduced, distributed, transmitted, used, modified, built upon, and otherwise exploited by anyone for commercial or noncommercial purposes.

###

Endnotes

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