Open Educational Resources and K-12 Learning:

Benefits, Challenges, and Where Do We Go From Here?

Sarah J. Hammershaimb

Athabasca University

Abstract

Open Educational Resources (OER) suit the nature of K-12 learning in the United States, providing educators the opportunity to personalize learning, differentiate for student needs, promote collaborative and digital learning experiences for students, and maximize shrinking funding. However, challenges to widespread OER acceptance, including determination of quality and lack of educator and policy-maker knowledge, have had limited nation-wide adoption. While research has begun to show positive effects of OER use on both K-12 student learning and district budgets, and perceptions of educators around OER, more research is needed in order to demonstrate the benefits of these freely available, customizable, and sharable learning materials to educators and policymakers.

Introduction

According to an analysis of state budgets in the United States, funding for K-12 education has continued to decline following the recession of 2008. The Center on Budget and Policy Priorities noted that 35 states reduced funding for education in the 2014 school year, and 27 states received less local government funding in the same time period. Additionally, some states have further reduced income tax, thus decreasing the amount of funds available for education (Leachman, Masterson, & Wallace, 2016). At the same time, the demographics of students enrolled in K-12 education have changed, revealing an increase in students who have diverse backgrounds, English language learning needs, or those who require special education services. (US Department of Education, 2016a, US Department of Education, 2016b, US Department of Education, 2016c). In the modern arena of K-12 education where school funding is limited and student need is diverse, Open Educational Resources (OER) may play a significant role, being cost-effective, adaptable and allowing for the personalization of learning. However, research regarding OER and K-12 education is still in its infancy and more research has been called for, including in the areas of instructor understanding and use of OER and OER efficacy. This paper will examine the current state of OER adoption and use in K-12 learning environments, highlighting both benefits and challenges, and outline areas for further research.

OER: Defined

Open Educational Resources is a term that was first used in 2002 at the UNESCO Forum on the Impact of Open Courseware for Higher Education in Developing Countries. This UNESCO forum offered the following definition of OER: “The open provision of educational resources, enabled by information and commercial technologies, for consultation, use and

adaptation by a community of users for non-commercial purposes" (as cited in Hylén, 2006, para. 4). Although a variety of definitions have been and continue to be proposed for OER, most researchers and adopters agree that OER refer to resources, existing in a variety of formats and freely available online, that are used for educational purposes and are either in the public domain, or are available for use (and reuse) with an open license (Hylén, 2006; Kelly, 2014; Kimmons, 2015).

Open Educational Resources have been defined by four permissions, or the 4 R's. These include the right of reuse, revision, remixing, and redistribution. Users of OER have the ability to freely use the resource in its original format, adjust the format, recombine the resource with other content to make it new, and redistribute all of these types of copies to others (Wiley, 2010).

Benefits of OER: Cost, Adaptation, and Personalization

With the implementation of the Common Core State Standards (CCSS) and the current financial and demographic condition of K-12 education in the United States, OER may provide an opportunity for school districts to reduce costs, and increase collaboration and sharing of materials to facilitate student learning (Bliss & Patrick, 2013). In fact, OER initiatives at a variety of levels have been planned in over 20 states in the United States. However, early work on initiatives demonstrates a need for policies to shape development, adoption and sharing of these resources (McGreal, 2015; Council of Chief State School Officers [CCSSO], 2015).

Although research on Open Education has most often targeted the field of higher education (Kimmons, 2014), Kelly (2014) suggested that K-12 educators were the group of educators with the strongest perception of the usefulness of Open Educational Resources. Whether this preference is due to limited funding or the nature of instruction in K-12 settings, the

rising emphasis on OER in K-12 education highlights the benefits and challenges of using these materials in working with learners.

Since OER are freely available online, a belief exists that OER provides a benefit of cost-savings to educational systems (Kelly, 2014). This belief has been substantiated by a comparative study of the cost of traditional textbooks and OER in seven higher educational institutions, which concluded that the use of OER had the potential to save students an average of $90 (USD) per course (Hilton III, Robinson, Wiley & Ackerman, 2014). When open textbooks were adopted in a variety of middle and high school science classes, researchers discovered that costs to the school district could be reduced by 50% without a decrease in student test scores (Wiley, Hilton III, Ellington & Hall, 2012). Costs are not only decreased by the lower price tag of an open textbook in comparison to a traditionally published one, but also by the reduction of time to acquire permission for reproduction of copyright materials, and a decrease in reproduction costs and licensing fees (Bliss & Patrick, 2013; McGreal, 2015). Although OER are free for instructor and student use, they are not free to develop, distribute and sustain. However, partnerships allow for the sharing of OER costs across institutions and users, and expenses are usually less and distributed differently than in traditional content models (McGreal, 2015). Thus, OER have the potential to "maximize and best leverage taxpayer's investments by allowing free sharing and reuse of resources developed by publicly funded institutions" (Bliss & Patrick, 2013, p. 4).

A second benefit of OER for K-12 learning is the adaptable nature of these resources. Because of the affordances of open materials, educators are free to adapt and improve materials used in their courses. Under copyright laws, instructors using traditionally published materials

have to “make do” with these textbooks, supplement with other materials and often wait for their district’s textbook adoption cycle. When using OER, instructors have the ability to “engage in continuous quality-improvement processes such as incremental adaption and revision, empowering instructors to take ownership and control over their courses and textbooks in a manner not previously possible” (Wiley & Green 2012, p. 83). These updates and improvements can accommodate changes in state and national learning standards, and in the learning needs of individual students (Bliss & Patrick, 2013). Moreover, as the use of digital devices continues to grow in traditional K-12 learning environments and the creation of online and blended K-12 classrooms rises, educators may discover that the lack of licensing restrictions on OER allows for customization, ease of use and support for collaborative learning activities (Kimmons, 2015; McGreal, 2015).

Through adaptation and customization, OER allows K-12 educators to personalize learning environments for their students. Instructors use their knowledge of their subjects and students to accommodate materials for specific learning needs, thus allowing for differentiation (Kimmons, 2015). Moreover, K-12 educators, themselves, view OER as providing for accommodation for diverse learning needs (de los Arcos, Farrow, Pitt, Weller, & McAndrew, 2016). In addition, OER may be used as supplemental materials for learners who need increased support or independent learning opportunities (Bliss & Patrick, 2013).

Challenges: Time, Training, Policy, Sustainability and Quality

Although the affordances and possibilities of OER are promising in the modern K-12 educational setting, challenges to widespread adoption and use exist. Research and informal

observation continues to demonstrate that lack of time, training, and support coupled with questions of quality and sustainability hinder the acceptance of OER, despite the numerous benefits to K-12 education.

Adopting and adapting OER for classroom use requires educator time. In addition to the creation and modification of resources, educators also may need training on how to use and work with these resources (Kimmons, 2015), which requires additional time and financial investment. Wiley, Bliss and McEwen (2014) noted that challenges to OER use include educator difficulty in discovering resources, sustaining resources, determining quality of resources, adapting resources for local environments and empowerment to remix resources. Currently, teacher training programs in the United States do not emphasize the use of OER, nor highlight copyright matters and repositories (Kelly, 2014). Hylén (2006) suggested that lack of educator awareness of copyright issues contributes to difficulty in the development and sharing of OER, which indicates that professional development around open licensing may improve OER use and development in K-12 schools. McGreal's observation (2015) that "there is a need for helpers and guides for teachers on OER implementation" (p. 8) is corroborated by the results of a survey (de los Arcos et al., 2016), showing that only a small percentage of educators responded positively to looking for open licensing when working with OER. de los Arcos et. al (2016) wondered if instructors may benefit from more training in open learning practices in order better adopt and adapt OER for their classroom.

Recognizing the need for professional development around OER for K-12 educators leads to a call for district, state, and national policy creation and support for these resources. (Johnson, Adams Becker, Estrada, & Freeman, 2014). McGreal (2015) noted that "a major

barrier to OER policy implementation is the lack of awareness among policy makers, administrators, teachers and the public. To date, very little marketing has been done to support the OER concept or initiatives in Canada" (p. 6). On the other hand, the EU has been a model in this area, with the "Opening Up Education" initiative.

In the United States, open policies must be developed on national, state, and educational system levels that support OER development and implementation. These policies must support the use of public funds to develop and sustain these resources (Wiley & Green, 2012). This is already being accomplished in a few states including Washington and Utah, and by the US Department of Education #GoOpen initiative. On a state level, Utah has been a leader as evidenced by the development of the Open High School of Utah, an online public charter school that exclusively uses OER content (Tonks, Weston, Wiley, & Barbour, 2013). Bliss & Patrick (2013) recommend state policy changes to better support OER including putting OER on state-approved materials lists and allowing instructional materials budgets to be applied to OER, funding OER evaluation committees, working towards developing professional development around OER, and funding digital devices for students utilizing OER.

The challenge of determining quality and promoting sustainability of OER affect their implementation on all levels of learning. Sustainability involves how to maintain creation and distribution of a resource that is free. Both Downes (2007) and Wiley (2010) have outlined suggested models for consideration and adoption. Kelly (2014) cautioned that since ease of use of OER is significant to an educator's perception of OER and actual use of the material, sustainability in known and trusted repositories is an important factor.

In the knowledge abundance of the modern educational systems, the determination of quality remains an obstacle to OER use. In a traditional publishing model, quality is associated with content experts, peer-review, graphic design and availability in alternative formats. Hylén (2006) recognized the effect of information abundance on the determination of OER quality, and proposed differing ways of addressing the quality question for higher educational institutions including institutional peer review, development of internal institutional criteria and allowance for educator reviews and comments on resources. According to their survey of 620 K-12 educators in 72 countries, de los Arcos et al. (2016) found that educators using OER perceived finding quality resources, in addition to time spent searching, to be challenging.

Some research indicated that determining quality of OER at a K-12 level may need to shift from publisher to educator (Kimmons, 2015), as the concept of quality embodies more than content in K-12 environments. Quality also includes standards alignment, reading level, supplementary materials, and suitability for classroom geography and diversity (Kimmons, 2015). In his blog, Wiley asked if the idea of quality should encompass a resource's effectiveness, or "the degree to which it supports learning" (Wiley, 2015b). Wiley argued that by associating the notion of quality with the process of material creation, the outcome of learning became less apparent. He questioned the idea that traditional publishing is the only manner in which to create resources that support learning (Wiley, 2015a) and referenced a study demonstrating the increase in student learning when OER was adopted instead of traditionally published texts in a math class. McGreal (2015) similarly wrote, "The true quality of any educational content is dependent on its usefulness in transferring knowledge and supporting learning" (p. 5). Acknowledging the existence of both high and low-quality OER, Kimmons

(2015) noted that "it is currently unclear how to best ensure quality in lieu of a traditional publication process, and the perceived lack of quality that results from this situation marks a major barrier for OER adoption" (p. 41).

Discussion: Areas for further research

The field of OER use and application continues to be developed by research, especially in the realm of K-12 education. Two areas that have been indicated for future research by those in the field are the improvement of instructor understanding of OER and the impact of OER use on student learning.

According to a survey of educator self-efficacy, Kelly (2014) found that K-5 educators had significantly lower self-efficacy ratings around OER compared with grades 6-12, higher education and workplace educators. Perhaps this is a call to incorporate OER instruction into professional learning and teacher education programs. Wiley (2010) agreed and wrote, "No approach or model for providing learner support to users of OERs has yet proven effective at scale. This remains an active and exciting research area in the field" (p. 9).

Moreover, educators may require additional training and exposure to open educational practices when using OER in the classroom. According to Kimmons (2014) and Rheingold (2010), information literacies must be developed by educators utilizing open resources and open educational practices. The concept of critical consumption as articulated by Rheingold (2010) perhaps addresses the need for educator evaluation of quality and usability of OER.

Additionally, the efficacy of OER and impact on student learning is another area for further research. According to Hilton III et al. (2014), "Limited research has been done regarding the efficacy of using OER instead of traditional resources" (p. 69). de los Arcos et al. (2016)

concurred. The Online High School of Utah study found that there was no difference in learning outcomes between students who had used traditional textbooks and open books (Wiley et al., 2012). Further demonstration of positive learning effects of OER, especially when compared to student learning using traditional materials may affect the adoption of OER in K-12 environments.

Conclusion

In conclusion, the impact of OER on the field of K-12 education continues to be an area for research. While there are demonstrated benefits to the adoption of these materials in K-12 learning environments including cost-savings and personalization of learning, there are also significant challenges including issues of quality, sustainability and policy. If continued research can highlight student achievement through the use of these resources, or if teacher training or government and district policies promote the use and development of OER, these resources may fulfill their intended purpose to provide opportunity and access to shared knowledge for all.

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