



## REL Appalachia Ask A REL Response

Online Courses

April 2019

### Question:

How do open educational resource (OER) initiatives impact student or teacher outcomes in K–12 settings?

### Response:

Thank you for your request to our REL Reference Desk regarding the impact of open educational resource (OER) initiatives. Ask A REL is a collaborative reference desk service provided by the 10 Regional Educational Laboratories (RELs) that, by design, functions much in the same way as a technical reference library. Ask A REL provides references, referrals, and brief responses in the form of citations in response to questions about available education research.

Following an established REL Appalachia research protocol, we searched for peer-reviewed articles and other research reports on impacts of OER initiatives. We focused on identifying resources that specifically addressed the impact of OER initiatives on student or teacher outcomes at the K–12 level. The sources included ERIC and other federally funded databases and organizations, research institutions, academic research databases, and general Internet search engines. For more details, please see the methods section at the end of this document.

The research team did not evaluate the quality of the resources provided in this response; we offer them only for your reference. Also, the search included the most commonly used research databases and search engines to produce the references presented here, but the references are not necessarily comprehensive, and other relevant references and resources may exist. References are listed in alphabetical order, not necessarily in order of relevance.

### References

de los Arcos, B., Farrow, R., Pitt, R., Weller, M., & McAndrew, P. (2016). Adapting the curriculum: How K–12 teachers perceive the role of open educational resources. *Journal of Online Learning Research*, 2(1), 23–40. Retrieved from <https://eric.ed.gov/?id=EJ1148381>

*From the abstract:* “It has been suggested that open educational resources (OER) can lower cost and lead to greater flexibility, however while there has been significant investment in opening up content there have been few studies looking at how these resources are

perceived by those who might use them. This quantitative article contributes to fill a gap in our knowledge of how K–12 educators teaching in face-to-face, online and blended contexts currently think about and use OER. It is part of the research carried out by the Hewlett-funded OER Research Hub (OERRH) Project to examine the impact of OER on teaching and learning practices. The authors report findings from a survey of 600+ schoolteachers who answered a set of attitudinal and behavioural questions in relation to how they use OER, what types of OER they use and what influences their selection of content, in addition to the purpose, challenges and perceived impact of OER in the K–12 classroom. The research highlights how OER allows schoolteachers to personalise learning through adaptation, and argues that mainstreaming OER in K–12 education is not only a matter of raising awareness but of changing teachers’ habits.”

Hilton, J., Larsen, R., Wiley, D., & Fischer, L. (2019). Substituting open educational resources for commercial curriculum materials: Effects on student mathematics achievement in elementary schools. *Research in Mathematics Education*, 18(3), 1–17. Retrieved from <https://www.tandfonline.com/doi/pdf/10.1080/14794802.2019.1573150?needAccess=true>

*From the abstract:* “Open Educational Resources (OER) have the potential to replace commercial learning materials in education. An empirical examination of this potential was conducted, comparing the end-of-year mathematics test results of 12,110 elementary school students clustered within 95 schools from five school districts in the state of Washington in the United States of America. Of this group, 6,796 students used open learning materials, and 5,314 used commercial educational resources. When three years of test scores were considered, there were no statistically significant differences in the exam scores of students who used open versus commercial curriculum materials. The lack of statistical significance may have practical significance, demonstrating that OER can replace conventional materials without impacting student performance, while potentially reducing costs and allowing for local modification.”

Kimmons, R. (2015). OER quality and adaption in K–12: Comparing teacher evaluations of copyright-restricted, open, and open/adapted textbooks. *International Review of Research in Open and Distributed Learning*, 16(5), 39–57. Retrieved from <https://eric.ed.gov/?id=EJ1077783>

*From the abstract:* “Conducted in conjunction with an institute on open textbook adaptation, this study compares textbook evaluations from practicing K–12 classroom teachers (n = 30) on three different types of textbooks utilized in their contexts: copyright-restricted, open, and open/adapted. Copyright-restricted textbooks consisted of those textbooks already in use by the teachers in their classrooms prior to the institute, open textbooks included alternatives from CK-12 and OpenStax, and open/adapted consisted of open textbooks that the teachers devoted time to adapting to their individual needs. Results indicate that open/adapted textbooks were evaluated as having the highest quality, and that open textbooks were of higher quality than copyright-restricted textbooks. Though some factors of quality might be influenced by cost differences (e.g., timeliness and the ability to adopt updated textbooks), results reveal that open and open/adapted textbooks

may do a better job of meeting the needs of K–12 teachers in a variety of ways that may not be captured through traditional approaches to quality assurance. This study marks an early step in exploring the quality of K–12 open educational resources (OER) and the use of practicing teachers as authentic evaluators of textbooks for their local contexts.”

Morales, R., & Baker, A. (2018). Secondary students’ perceptions of open science textbooks. *Journal of Interactive Media in Education*, 1(4), 1–9. Retrieved from <https://eric.ed.gov/?id=EJ1170966>

*From the abstract:* “In an attempt to align instructional resources with new state standards and to increase teacher awareness of these standards, one large suburban public school district piloted the development and adoption of open secondary science textbooks. Open textbooks created by teachers in grades six through nine replaced conventional science textbooks provided by mainstream publishing companies. Therefore, grade nine students were not included in this study. At the end of the first quarter, middle school students (grades six through eight) who used the open textbooks were surveyed. Survey responses required respondents to consider their learning before and during the use of the open textbook. The survey included quality and presentation of content questions, as well as an opportunity for students to explain their responses. There were qualitative and quantitative indications that students’ perceptions of an open textbook in place of a standard textbook are improving students’ attitudes and behaviors toward learning.”

Robinson, T., Fischer, L., Wiley, D., & Hilton, J. (2014). The impact of open textbooks on secondary science learning outcomes. *Educational Researcher*, 43(7), 341–351. Abstract retrieved from <https://eric.ed.gov/?id=EJ1042753>; full text available at <https://journals.sagepub.com/doi/pdf/10.3102/0013189X14550275>

*From the abstract:* “Given the increasing costs associated with commercial textbooks and decreasing financial support of public schools, it is important to better understand the impacts of open educational resources on student outcomes. The purpose of this quantitative study is to analyze whether the adoption of open science textbooks significantly affects science learning outcomes for secondary students in earth systems, chemistry, and physics. This study uses a quantitative quasi-experimental design with propensity score matched groups and multiple regression to examine whether student learning was influenced by the adoption of open textbooks instead of traditional publisher produced textbooks. Students who used open textbooks scored 0.65 points higher on end-of-year state standardized science tests than students using traditional textbooks when controlling for the effects of 10 student and teacher covariates. Further analysis revealed statistically significant positive gains for students using the open chemistry textbooks, with no significant difference in student scores for earth systems of physics courses. Although the effect size of the gains were relatively small, and not consistent across all textbooks, the finding that open textbooks can be as effective or even slightly more effective than their traditional counterparts has important considerations in terms of school district policy in a climate of finite educational funding.”

Wiley, D., Hilton, J., Ellington, S., & Hall, T. (2012). A preliminary examination of the cost savings and learning impacts of using open textbooks in middle and high school science classes. *The International Review of Research in Open and Distance Learning*, 13(3), 262–276. Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/1153/2256>

*From the abstract:* “Proponents of open educational resources claim that significant cost savings are possible when open textbooks displace traditional textbooks in the classroom. Over a period of two years, we worked with 20 middle and high school science teachers (collectively teaching approximately 3,900 students) who adopted open textbooks to understand the process and determine the overall cost of such an adoption. The teachers deployed open textbooks in multiple ways. Some of these methods cost more than traditional textbooks; however, we did identify and implement a successful model of open textbook adoption that reduces costs by over 50% compared to the cost of adopting traditional textbooks. In addition, we examined the standardized test scores of students using the open textbooks and found no apparent differences in the results of students who used open textbooks compared with previous years when the same teachers’ students used traditional textbooks. However, given the limited sample of participating teachers, further investigation is needed.”

### **Additional Organization to Consult**

The Open Education Group (OEG): <https://openedgroup.org/>

*From the website:* “The Open Education Group is an interdisciplinary research group that (1) conducts original, rigorous, empirical research on the impact of OER adoption on a range of educational outcomes and (2) designs and shares methodological and conceptual frameworks for studying the impact of OER adoption. We also teach courses in topics relating to open education.”

Open Education Research Hub (OER Hub): <https://oerhub.net/>

*From the website:* “The Open Education Research Hub (OER Hub) are leaders in researching the impact of open educational resources (OER) on teaching and learning practices. Our aim is to raise the quality and profile of research in this field. OER Hub has three key objectives:

- Building capacity in the OER research domain
- Conducting research into open education and OER
- Producing resources for the open education research community.”

## **Methods**

### **Keywords and Search Strings**

The following keywords and search strings were used to search the reference databases and other sources:

- “Open education\* resources” AND (elementary OR secondary OR “K-12”) AND (impact\* OR eval\* OR outcome\*)
- (“Open access” OR “no cost” OR “open source”) AND textbook AND (elementary OR secondary OR “K-12”) AND (impact\* OR eval\* OR outcome\*)

### **Databases and Resources**

We searched ERIC, a free online library of more than 1.6 million citations of education research sponsored by the Institute of Education Sciences (IES), for relevant resources. Additionally, we searched the academic database ProQuest, Google Scholar, and the commercial search engine Google.

### **Reference Search and Selection Criteria**

In reviewing resources, Reference Desk researchers consider—among other things—these four factors:

- Date of the publication: Searches cover information available within the last ten years, except in the case of nationally known seminal resources.
- Reference sources: IES, nationally funded, and certain other vetted sources known for strict attention to research protocols receive highest priority. Applicable resources must be publicly available online and in English.
- Methodology: The following methodological priorities/considerations guide the review and selection of the references: (a) study types—randomized controlled trials, quasi experiments, surveys, descriptive data analyses, literature reviews, policy briefs, etc., generally in this order; (b) target population, samples (representativeness of the target population, sample size, volunteered or randomly selected), study duration, etc.; (c) limitations, generalizability of the findings and conclusions, etc.
- Existing knowledge base: Vetted resources (e.g., peer-reviewed research journals) are the primary focus, but the research base is occasionally slim or nonexistent. In those cases, the best resources available may include, for example, reports, white papers, guides, reviews in non-peer-reviewed journals, newspaper articles, interviews with content specialists, and organization websites.

Resources included in this document were last accessed on April 4, 2019. URLs, descriptions, and content included here were current at that time.

This memorandum is one in a series of quick-turnaround responses to specific questions posed by education stakeholders in the Appalachia region (Kentucky, Tennessee, Virginia, and West Virginia), which is served by the Regional Educational Laboratory Appalachia (REL AP) at SRI International. This Ask A REL response was developed by REL AP under Contract ED-IES-17-C-0004 from the U.S. Department of Education, Institute of Education Sciences, administered by SRI International. The content does not necessarily reflect the views or policies of IES or the U.S. Department of Education, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. government.