Offline OER and the Reusability Paradox

The potential of open educational resources, like those we share via Kolibri, is determined by the imagination of those who use and reuse them.

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One of those people is our friend and staunch OER advocate, Werner Westermann. Presently with the Library of Congress of Chile, he has over 20 years of experience with ICT-enabled education and training with ministries, higher education, and non-profit institutions, as well as being an OER researcher and deployer. Recently, he has led curriculum alignment efforts in Chile, Honduras, and others using Kolibri Studio and the Kolibri Content Library.

In this guest blog post, he reflects on the future of this type of work, using OER, by discussing the reusability paradox, a key concept for those planning to use OER in their projects, and how he used the Kolibri Studio tool to circumvent it. By understanding and planning for the reusability paradox, creators, educators, technologists, and administrators can eliminate many of the obstacles to reusing OER right from the start.

Our friend, staunch OER advocate, and author of this blog post, Mr. Werner Westermann.

The year 2002 will be remembered as the moment where Open Education was redefined, thanks to the launch of significant initiatives like MIT OpenCourseware, Wikipedia, and the Creative Commons licenses. It was also the year that UNESCO coined the term Open Educational Resources: OER.

In that same year, David Wiley, one of the founders of the "OER movement" and one of its most respected voices, alerted OER enthusiasts to the Reusability Paradox. The idea derived from his investigations into the theory of Learning Objects: the popular, but controversial digital education idea that learning materials could be treated as narrow "building blocks," which can then be assembled and disassembled to meet different learning goals.

In summary, the paradox was an expression of the trade-offs between the pedagogical effectiveness of a learning object and its potential for reuse. It dealt with modularization (granular and self-contained) and integration (assembly and combination) of digital learning resources. So for example, if we were to build a resource for a specific learning outcome (granular) it would be more significant to a specific context and therefore have more impact in the expected learning, but it would be less reusable in other contexts, and would not enable further scalability. On the other hand, if we were to bundle (integrate) larger groups of resources, we can expect more reusability and scalable solutions, but they wouldn't be responsive to the specific learning context, thus minimizing their effectiveness.

In effect, the Reusability Paradox forced learning designers to polarize their decisions: to build (1) highly contextualized resources that teach effectively or (2) highly decontextualized resources that can be reused broadly, but teach very little. Or worse, force a balance between effectiveness and reusability — falling to a mediocre middle where neither side was honored.

Werner presented the Reusability Paradox as a subject matter expert at Learning Equality's webinar on curriculum alignment in February 2021. Check out the recording.

Another interesting consequence: the reusability of a learning object foreshadows its possible automation, which could be dire for OER: "the more reusable a learning object is, the harder its use is to automate. Identically, the less reusable a learning object is, the easier its use is to automate". Wiley concluded that "this discovery is depressing, indeed!"

One type of reuse: curriculum alignment

Recently, I've been wondering about the Reusability Paradox as it relates to curricular alignment for K-12 education. What could we learn from the practical experience of conducting this work? Are there certain strategies that would minimize the effect of the paradox?

Thanks to a Creative Commons' OpenEducation Platform grant, my team and I took on the challenge of matching existing offline OER to the learning objectives/outcomes of the official "prioritized" K-12 Math curriculum in Chile: a core group of selected learning outcomes to be assured during school disruption caused by the Covid-19 pandemic, looking to compress an extensive content-driven curriculum. We worked between 5th and 10th grades, creating a "channel" of aligned OER for Kolibri, an end-to-end suite of open-source tools, content, and DIY support materials, designed for offline-

first teaching and learning in context with little or no connectivity, developed by the nonprofit organization Learning Equality

The results of this reusability practice (matching a resource to be used in a different context) were auspicious: thanks to Kolibri Studio, an online tool to host and create OER packaged in learning "channels", **we aligned over 1100 OER, mostly interactive content, to the curricular learning outcomes, leading to 100% coverage of each grade level.**

Kolibri Studio had several advantages for us: it offered a tree folder structure to select, organize, and intentionally sequence the resources, a strong search engine that lets you search resources by keywords, and a preview feature that lets you take a sneak peek within the resource to validate your alignment decision. It's also a web-based tool, making it possible to collaborate on alignment in a participatory framework.

Thanks to additional support from Learning Equality, we were able to extend the channel to align 1st-4th grade and 11th-12th grades as well, completing a full K-12 solution for Chilean students. In parallel, we took on the challenge to create a Math content channel for grades 7th to 9th aligned to the official curriculum of Honduras.

Which resources did we find most reusable for this purpose? The flagship in our alignment work has been the granularity and abundance of Khan Academy resources, enabling a rich mix of video lectures and interactive exercises. Thanks to the quantity, it's easy to bundle and sequence OER aligned to the specific learning objectives and outcomes with precision. We also reused other Spanish Kolibri resources from the Mexican Proyecto Descartes, PhET simulations, and CK-12 resources.

Spanish resources available on Kolibri. Take a look at them on the Kolibri Content Library Catalog.

On Kolibri Studio, if there wasn't a pre-existing OER matching a learning outcome, we could upload a new or other existing resource. If not, we could create interactive question(s) to fill any possible gaps.

We know our work is never complete; enhancement is always needed. Although we have high coverage of outcomes, there is a disparity of quantity and of quality resources between different learning objectives. There's scarcity in some content areas and grade levels. For instance, we need more interactive resources related to Geometry and Statistics, and the scarcity in lower levels is obvious.

Overcoming the paradox

David Wiley has mentioned over the years that **a way to escape from the Reusability Paradox is openness**. When learning resources are published with an open license, anyone can produce something that's *both* reusable and deeply contextualized, highly effective for a specific setting: "*The paradox disappears. I've produced something with a strong internal context which you have permission to make fit into other external contexts*". This clearly solves the modularization side of the paradox, but what about the integration side, especially the scalability issue?

In fact, the permissions granted by an open license open up the opportunity to revise and adapt, but someone actually has to do the work of contextualizing and customizing the educational resources. This is a significant workload, and it's not a minor issue. Based on what I hear from open source software developers, if it takes too much effort to modify and re-combine materials towards a solution, fewer people will be inclined to pursue the "5 R's", the different permissions for OER use.

This is a significant problem of leadership, administration, and integration necessary to build and steward larger collections of granular pieces together into a useful whole. So, as resources are more fine-grained, it will make the integrated whole too difficult to render coherent…unless you also have an efficient infrastructure.

Our experience with Kolibri Studio has shown us that it's useful to have a tool to make use of a wide repository of OER reusable to build content channels, and that with it it is possible to conduct curricular alignment with precision to the official learning outcomes. Tools like this can foster scalable integral and robust solutions, like building a full K-12 curriculum in a couple of months. But there are many ways to develop infrastructure to solve specific problems in OER management: other K-12 OER initiatives, like Open Up Resources, have shown the success of integrated and robust solutions pre-aligned to standards, instead of a big quantity of isolated resources.

Lessons for improving infrastructure for OER

> *However successful individual projects might be, it's the development of "efficient infrastructure" for the whole community that will truly enable us to overcome the paradox.*

First, diversity and quality of OER and learning content in Spanish are critical for our infrastructure. Although there are 15 channels of Spanish resources accessible from the Kolibri Content Library, there's an urgent need for more aligned Spanish materials, especially interactive ones (many OER comprise a lot of static content or PDFs). While in Math we cover the K-12 sphere well, there are fewer resources in Natural Sciences, and in other key subjects like Language or Social Sciences, there's very little or nothing. In these last subjects the challenge is even greater as the need is for localized content (highly contextualized), as previously discussed, with a strong need to involve local producers and teachers to create pertinent OER.

In our work, we actually began to use aligned resources from the Mexican or Peruvian curriculum, as they matched. Hence, we saw great potential to build reusability among our Latin American region due to our common Spanish language and similar educational traditions. Thus we celebrate the idea of creating a specific hub of OER curricular alignment initiatives within the Kolibri community to learn and share.

Making it easier to bring existing resources onto tools like Kolibri Studio is also critical. In our work, we mentioned the scarcity of resources in Geometry, so we approached the Geogebra community website, where you can export interactive content. As Kolibri Studio supports SCORM packages, we tried to import these Geogebra packages, albeit without success. But thanks to the open source spirit, we found a simple technical solution to import Geogebra interactive applets to embed Geogebra packages into

Kolibri. The lesson learned is a regulatory one: if we define open technical protocols and specifications, we can reuse quality interactive OER from a global and vibrant community of practitioners like Geogebra.

Another regulatory issue is related to licensing. Just taking into account the Creative Commons licenses, there's not only one, but six licenses, each with different degrees of openness. Moreover, two of those licenses are not suitable to the OER definition because they do not allow derivatives. We have to avoid non-permitted reuse because of compatibility problems when remixing or creating collections of OER with different licenses. Maybe we can "harmonize" the licensing by advocating for a specific license or even create an explicit policy around content for educational use, hopefully using "more" open licenses aimed at maximizing the flexibility and reusability capacity of the resources.

Flying free, flying open

Human beings from many cultural backgrounds have been fascinated with the "colibrí" (hummingbird in Spanish) since ancient times... One of its numerous meanings as a symbol is a messenger that comes from the skies, and from the heavens.

> ***I like to think that, when using Kolibri, we receive the message to persevere in amplifying equitable access to quality learning opportunities, especially for those who need it most.***

Making #KolibriFly in our open community is a great contribution, and enables new approaches to the problems that persist. But no paradox is unresolvable when we take steps towards wider permissions and rights within a freer, more collaborative, and more trustworthy ecosystem.

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