

The Wikipedia Library: The largest encyclopedia needs a digital library and we are building it

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Introduction

*"I have always imagined that Paradise
will be a kind of library."
— Jorge Luis Borges*

Wikipedia is positioned to become virtual front page of every library in the world—a ubiquitous starting point for public information gathering, a jumping off point for deeper learning—and a natural ally of libraries, in partnership to complete a virtuous circle of research and knowledge dissemination. With over 45 million articles and 40 million free images, Wikipedia is a top-5 global website: over 500,000,000 readers each month view it a total of 8,000 times per second. And Wikipedia’s readers don't stop their learning at Wikipedia articles—there are many indications that people use Wikipedia as a holistic research platform. A striking example is that Wikipedia refers the sixth most traffic to all CrossRef DOIs online.¹

The Wikipedia Library (TWL) aims to deliver library and research services to every editor and reader of the site, making possible access to the references which support the “sum of all human knowledge”. TWL is a global program supported by the Wikimedia Foundation to develop shared library infrastructure and services for Wikipedians and Wikipedia readers. We partner with scholarly publishers to increase access to research, build community-run support hubs and tools to improve reference, and reach out to libraries and librarians. The program’s focus has been to give the Wikipedia editing community of 100,000 monthly volunteers free access to paywalled research material, so they can cite reliable content and provide accessible summaries to the public in Wikipedia articles.

Since its inception in 2011, TWL has established partnerships with nearly 70 publishers, including the largest and most scholarly collections, to provide free access for Wikipedians to over 80,000 unique periodicals and an even greater number of books.² TWL expanded its scope as we developed other relationships focused on references: for example, working with Internet Archive to fix over one million dead citation URLs, developing *OABot* to link to versions marked as free-to-read alongside paywalled content in citations, and integrating WorldCat's 380 million ISBNs into our automatic citation generator tool.

The success of the program grows from what we learn in partnership with library professionals. The TWL team co-wrote two International Federation of Library Associations and Institutions (IFLA) white papers on Wikipedia collaboration with academic and public libraries, and have presented at the American Library Association Annual Conference, the Coalition for Networked Information Membership Meeting, Internet Librarian, the Frankfurt Book Fair, OpenCon, Open Scholarship Initiative, and Digital Library Federation Forum, among many other conferences.

When we began speaking about our work in library venues in 2012, the reception was curious but cool; five years later, Wikipedia's role in the library ecosystem is often met with enthusiasm and excitement. It has moved from "what are you doing here?" to "how can we get involved?" This transition, from being on the fringes to in the center, reflects the broader acceptance of Wikipedia and the recognition of its central role in the public's quest for useful information.

Looking forward, TWL has several priority areas and projects to pursue:

For editors, TWL is working on technical solutions and infrastructure. Chief among these is the Library Card Platform, a central application system for tracking signups and delivering access to high-quality research material. The aim is to provide many of the features that are expected from a research library: direct proxy authentication to sources, full-feature search discovery, and integrated reference service. Another project involves supporting the development of *Librarybase*, an environment which stores Wikipedia's citations as structured metadata, with an API that can give research recommendations based on bibliographic structure.

For readers, our focus includes developing information and research literacy resources, as well as a universal reference service for all readers regardless of location or affiliation. We hope to reach a day where Wikipedia provides on-demand access for all Wikipedia readers to citations in research, as well as OpenURL referral to library resources, and links to full-text Open Access (OA) versions of paywalled content.

With libraries and librarians, TWL wants to engage reference experts to help us improve our shared digital research ecosystem. Since many library patrons use Wikipedia and its sister sites, librarians should have strategies for supporting Wikimedia projects, including understanding how content is created and maintained by becoming editors themselves. To that end, engagement with professional networks such as the International Federation of Library Associations (IFLA) and the Association of Research Libraries (ARL) will help librarians work with their patrons in

knowledge discovery and curation, as will expanding the popular #1lib1ref (One Librarian, One Reference) global microcontribution campaign.

The future of collaboration and integration between Wikipedia and libraries and Wikipedians and librarians looks very bright. We hope that our organization and programs have extended the dialogue and sparked new conversations among two natural allies in the realm of free knowledge.

Beginnings

*"Bad libraries build collections,
good libraries build services,
great libraries build communities."*

—R. David Lankes

Wikipedia is the world's largest free online encyclopedia, with over 45 million articles across almost 300 languages, all written and edited by volunteers. Because of its requirement of *verifiability*—which states that facts and their interpretations should be accompanied by a citation to a reliable source verifying them—the quality of Wikipedia depends on the ability of its volunteers to access the best and most reliable scholarship on a topic. Ultimately, the website's efficacy depends on readers understanding this premise, so that they use Wikipedia as a starting point and not an ending point for their research, and so that they too understand how to contribute relevant content to the project. These are the fundamental issues The Wikipedia Library was inspired to advance.

The Wikipedia Library started in 2010 as an English Wikipedia community-based volunteer effort, to address the lack of access to reliable sources for editors to build Wikipedia articles. The Library's first initiative was to seek account donations from publishers and aggregators to provide access to editors so they could summarize and cite this research on Wikipedia.

An anecdote reveals the simple but powerful alignment between the interests of Wikipedia's editors and publishers of reliable sources. When I founded The Wikipedia Library, one of my very first calls was to the news and magazine aggregator HighBeam Research, to gain a few additional resources for a minor biography I was writing. Upon being asked, "for an account for me... and maybe a few for my close editing friends," HighBeam's head of customer service remarked, "*How about 1000?*"

Credo Reference was the earliest partner, providing 500 free accounts to top article writers in 2011. HighBeam, Questia, Cochrane, and JSTOR followed in 2012. The project received funding for a pilot experiment from the Wikimedia Foundation in 2013 in the form of an Individual Engagement Grant, broadening its outreach efforts and developing community capacity to scale.³ The editing community's enthusiastic reception and positive participation in the program led to TWL being incorporated into the Wikimedia Foundation in 2014 as part of what is now the Community Engagement department.

From the beginning, The Wikipedia Library set ambitious and broad goals⁴:

Connect editors with their local library and freely accessible resources

Facilitate access to paywalled publications

Build relationships among editors, librarians, and cultural heritage professionals

Facilitate research for Wikipedians and readers

Promote broader open access in publishing and research.

TWL advances these efforts through a global branch strategy: 22 different Wikipedia language projects now have TWL branches, including French, German, Arabic, and Finnish.⁵ Global efforts are driven by a core team of staff, contractors, and over 100 volunteer coordinators, which allows insights from one branch to be shared with others.

The Wikipedia Library works in tandem with the broader GLAM-Wiki movement (Galleries, Libraries, Archives, and Museums). The budding community of practice around Wikipedia and Libraries is a sign of a radical shift in the nature of authority and knowledge production: from scholarly credentials and expertise to literate evaluation of myriad references, from individual authors imbued with the authority of the academy to diverse crowds of contributors with varying levels of expertise. Three reflections illustrate the profound transition in which Wikipedia has come to be seen as an essential part of the information and research literacy ecosystem:

"Wikipedia is increasingly becoming the go-to reference resource for the newest generation of students... Librarians and faculty should help remove the stigma associated with Wikipedia by embracing this Website and its imperfections as a way to make information literacy instruction valuable for the twenty-first-century student."⁶

"When asked to contribute to a wiki—a space that's highly public and where the audience can respond by deleting or changing your words—college students snapped to attention, carefully checking sources and including more of them to back up their work... Instead of blindly consuming the content, they understand where the research comes from and how it gets there. In the past, we've told them not to use Wikipedia. That's insane. Rather than saying, 'It doesn't have a place in the academy,' let's explain to students how it can be used as a tertiary resource. It's not the end-all and be-all of research, but it's incredibly useful."⁷

"Producing information for others in online environments can give young people a starting point for reflecting on where information comes from; such experiences support second-order information literacy skills, which require students to reflect on the nature of information production...If we want to develop a more local, shared sense of responsibility, continuing efforts to incorporate public information production in classrooms should include opportunities for students to support and challenge one another in justifying and critiquing claims, as is done by co-authors on Wikipedia."⁸

The Wikipedia Library did not create this trend, but it has helped accelerate it through efforts to improve the work and lives of Wikipedia's editors, readers, and the network of librarians that support them. TWL's annual #lib1ref campaign built on that momentum with a simple social media-friendly call to action: *imagine a world in which every librarian added one more reference to Wikipedia*. Imagine a world in which librarians were as much contributors to Wikipedia as they are critical consumers of its content.

For Editors: A Wikipedia Library Card

"When I got my library card, that's when my life began."

— Rita Mae Brown

The founding mission of The Wikipedia Library is to connect content editors on Wikimedia projects with the reliable sources they needed to develop articles—to ensure that the content is supported by the highest quality sources, and to open up topics not covered by locally available or free online references.

One Iranian recipient of TWL access from JSTOR described:

"Things changed when the international sanctions against Iran expanded and included banking transactions. Subscription fees could not be paid and the growing difficulties reduced my motivation to work on Wikipedia for free. However, thanks to the Wikipedia Library, I received JSTOR access, which incorporates Iranian Studies; this new access allowed me to continue my work on articles like *Kelidar*, the longest Persian novel.

Subscription access is a must for Persian Wikipedia editors, not just due to the lack of reliable sources in Iran or Afghanistan, but because of the systematic bias and censorship that is so prevalent among books published in these countries. I even consider the Wikipedia Library a helpful project to counter the systemic bias in English Wikipedia itself. While every river or hill in North America or Europe has its own article, many vital issues concerning developing countries have not been covered. By getting global editors like me free access to rich digital libraries, we will be even more encouraged to write decent articles about our culture and geography in your language."⁹

Serving individual editors, "arming them with reliable sources", has long been an aspiration for The Wikipedia Library. This partnership model has grown to nearly 70 publishers and aggregators—including EBSCO, SAGE, Taylor & Francis, Elsevier, Oxford University Press, and Project MUSE—providing access to over 80,000 unique periodicals and a greater number of books, to thousands of editors for a year per partner per signup.

The standard distribution process for this access has not been elegant. It has required editors to apply individually for each partnership they want access to, for applications to be vetted against account activity and experience criteria, to be approved and processed individually by dozens of coordinators, and for per-editor access codes to be delivered or accounts created by the publisher such that they expire one year after activation. This time-consuming process involved unnecessary duplication of effort and inefficiency in workflows, resulting in a multi-week wait between application and receipt of access. While this is certainly better than no access at all, we recognised quickly that there was obvious scope for improvement.

In an effort to solve these problems, TWL is currently developing a *Wikipedia Library Card* platform (<https://wikipedialibrary.wmflabs.org/>) to streamline application processes for database access and to deliver an access experience more similar to that of research libraries. It provides a

centralized interface through which editors can apply for access to resources and volunteers can process those applications. This central platform greatly improves the efficiency of the access grant process—projections suggest an eventual wait time of only a few days rather than a few weeks for most resources.

The Library Card system supports a wider variety of resource provision modes than previously available under TWL. The application process is streamlined and can be partially or fully automated, depending on the approach preferred by the publisher. Foremost, it can support a proxy-based authentication system with single sign-on for users. This will rapidly improve access to research for content editors.

An instantaneous access system is also being developed called the *Library Card Bundle*. In this iteration, access is approved through the system automatically rather than manually, so it can be granted on an as-needed basis to tens of thousands of editors instead of just hundreds at a time. The bundle approach solves the problem of users requesting access to a source simply to read a few specific articles rather than long-term research in the topic area. Now, instead of occupying one of a limited number of slots for an entire year, a far greater number of users can simply gain access to what they need when it is needed.

Once this initial phase of authorization and development is completed, the next step is to integrate additional digital library services. A key component of the system will be a web-scale discovery service to allow users to find content across all publishers from a single search box.

The service will index, in full text wherever possible, the resources available through the various partnerships The Wikipedia Library has established, as well as open access content. Instead of visiting a series of individual publisher or database sites to search for resources, editors will be able to search centrally and discover most of the available sources on their topic of interest. Link resolvers will allow users to move seamlessly from search to the full text, further improving search efficiency. Integrated online reference support can also be delivered through the proposed system to assist users in locating content relevant to their research, and potentially to provide practical learning opportunities for library and information students in the model of the Internet Public Library.

The Library Card system also has the potential to greatly enhance the acquisitions process used by The Wikipedia Library. Currently, major publishers are highly requested whereas still-valuable alternatives with a lower profile are often overlooked. A discovery service can enhance the usage of niche publications by exposing them to unfamiliar users. Implementation of a discovery service generally increases full text downloads of indexed publications.¹⁰ An automatically generated A-Z list will educate readers on which databases index a particular journal of interest, allowing them to be better informed on which partnerships they would want to request. This would replace a manually curated list, which is cumbersome to search and update.

The Wikipedia Library Card is a novel and challenging solution. It is effectively a global library, open to qualified Wikipedia editors from any country or region on the planet, and without any daunting subscription costs.

For Readers: From Informed Access to Open Citations

"A library implies an act of faith..."
— Victor Hugo

Half a billion people each month use Wikipedia for research, but many may not understand how it is constructed and how to best make use of it. Wikipedia's principle of verifiability institutes an ideal that all knowledge in the encyclopedia, whether facts or outside opinions, are supported by a reliable secondary source—but sources that readers cannot access and read are of limited use in furthering research.

The Wikipedia Library is developing research literacy materials to help support readers in understanding how Wikipedia is built and how to explore its underlying sources. This ranges from supporting instruction on how Wikipedia works, to tools that help readers get from citations to sources, to help pages about locating a local library. These initiatives will contribute to the development of a more informed citizenry able to use Wikipedia (and other information sources as well) in a responsible manner, by examining the original sources to assess the validity of an article's claims.

The Wikipedia Library has also piloted open-referencing strategies. For example, Newspapers.com encouraged Wikipedia editors to use their *clippings* feature (<https://www.newspapers.com/clippings/>) for references on Wikipedia. Each clipping creates a

free-to-read openly available excerpt of sections of Newspapers.com articles which allow readers to see the same content as the editors researching for Wikipedia.¹¹

We would like to eventually transition key publisher partners to a *toll-free access referral* program that could drastically enhance reader access to sources. Under this model, a reader clicking on a paywalled link on Wikipedia could gain full text access to the source without needing a login or affiliation, solely because the traffic is referred from Wikipedia. This would open to readers the scholarly resources on which Wikipedia is built, allowing them to truly use it as a starting point for research even if they are unaffiliated with well-resourced libraries or do not meet the criteria for access in the Library Card Platform.

Another factor blocking access to sources is linkrot—when content at a particular URL is moved or deleted—which leads to the previously live link becoming a *dead* link. A partnership with Internet Archive (IA) and volunteer community members led to more than one million outbound broken links on English Wikipedia being replaced with archived versions, ensuring that readers are still able to access the original sources cited.¹² Using a Wikipedia bot and IA's Wayback Machine, Wikipedia articles are scanned to test if they are dead; if they don't properly resolve then the Internet Archive version most-closely dated to when the original link was added is inserted if available. Continued work in this area will expand the process to other language Wikipedias and implement methods to fortify our online citations against linkrot problems from the very moment when they are first added to Wikipedia.

While editors benefit directly from TWL's publisher relationships, readers face the same obstacle of closed access paywalls that TWL was created to overcome for editors. *OABot*

(<https://en.wikipedia.org/wiki/Wikipedia:OABOT>) is a tool that finds open access versions of references in Wikipedia articles. If no URL is included in the citation, it adds one that points to an open access repository version of the source; if one is available, OABot uses the *Dissem.in* service (<http://dissem.in/>) to find these versions from sources like CrossRef, BASE, DOAI, and SHERPA/RoMEO. On an article like Cancer, which has 200 citations, 15% will have free-to-read links to repository versions added. Those links will be accompanied by a green open lock icon broadcasting their availability to readers. This expands on previous efforts led by Daniel Mietchen and other open access advocates to present icon-based indications of open access sources as part of the OA Signalling Initiative

(https://en.wikipedia.org/wiki/Wikipedia:WikiProject_Open_Access/Signalling_OA-ness). The growing prominence of both open access publishing and article-level metrics (altmetrics) amplify each other on Wikipedia:

"The odds that an open access journal is referenced on the English Wikipedia are 47% higher compared to closed access journals. Moreover, in most of the world's Wikipedias, a journal's high status (impact factor) and accessibility (open access policy) both greatly increase the probability of referencing. Among the implications of this study is that the chief effect of open access policies may be to significantly amplify the diffusion of science, through an intermediary like Wikipedia, to a broad public audience."¹³

Part of supporting readers is making the creation of accurate and thorough citations easy in the first place. Through a TWL partnership with OCLC, editors can now use the WorldCat API to automatically generate book citations in Wikipedia articles. They need only enter the ISBN in a citation tool, which then draws from WorldCat to return fully formatted bibliographic metadata,

including an OCLC identifier that links to libraries in which the book can be found.¹⁴ This service, alongside similar services offered by Crossref for DOIs and using the PMID database, ensures that citation information provided in a Wikipedia article points readers to a deeper resource on the topic.

Lastly, TWL is working on the frontiers of meta-knowledge about our project's content. *Wikidata* (<https://wikidata.org/>) is a newer Wikimedia project created to store structured data. It is a language-independent, linked, open, structured database that is openly editable by both humans and computers. Since 2012 it has grown to include over 25 million items, each with a unique Wikidata identifier. TWL participates in WikiCite (<https://meta.wikimedia.org/wiki/WikiCite>), the collaborative community effort that aims to take advantage of Wikidata to build a repository of all the citations on Wikipedia and to design tools to take advantage of this rich data.

With Librarians: Collaboration on a Shared Vision

*"My library
Was dukedom large enough."
— William Shakespeare*

The Wikipedia Library envisions librarians and Wikipedians as natural allies in working towards a goal of access to reliable information.

An early effort pioneered by TWL, in partnership with OCLC, was the creation of the first-ever *Wikipedia Visiting Scholar* (WVS) roles.¹⁵ Through the WVS program, Wikipedia editors gain

online access to an educational institution's library resources like databases, journals, ebooks, and special collections. A WVS, like a Wikipedian-in-Residence (WIR), works in partnership with an institution to help expose its content on Wikipedia. The WVS role differs in that it is remote, unpaid, and primarily focused on creating content rather than building institutional capacity. Libraries get involved because of a desire to see their collections put to good use and to make a difference in public knowledge in one or more topic areas. Wikipedians receive access to specialized and paywalled content to expand and improve articles in topic areas they already care about. A Wikipedia Visiting Scholar at Rutgers University shared:

“This was both Rutgers University’s first collaboration with Wikipedians, as well as [my] first collaboration of this type with an organization. The initiative from Rutgers’s side was directed by ... Grace Agnew, who has been accessible, friendly, and resourceful throughout the whole exchange. As part of this initiative, twelve members from the Rutgers University team have learned more about how to add content to Wikipedia. Aside from teaching librarians and students about Wikipedia, I have also been the student. Graduate students Yingting and Yu-Hung jointly held a video conference with me on how to access the library resources of Rutgers remotely and how to use Medical Subject Headings (MeSH) to investigate healthcare-related subjects.”¹⁶

While the program is focused on content creation it also clearly opens a channel for exchange of ideas, making it an ideal entry-point for institutional partnerships. The Visiting Scholars program was piloted by TWL in 2014 and was passed off to the Wiki Edu Foundation for all North American positions in 2016.

The #1lib1ref campaign (<http://1lib1ref.org>) goes further, calling upon librarians all over the world to add a single citation to Wikipedia themselves. It was created by TWL to offer a low-barrier-to-entry option for engagement, using a combination of a microcontribution, a semi-automated interface, and a viral hashtag. The #1lib1ref campaign took advantage of the

volunteer-developed Citation Hunt tool (<https://tools.wmflabs.org/citationhunt>), which automatically isolates sentences flagged with a “citation needed” tag, and presents them to the user for fixing. This simple workflow fostered significant participation rates in both English and other language Wikipedias.

#lib1ref was conceived in fall 2015 by TWL project manager Alex Stinson, who recognized the potential of Citation Hunt. He took the functionality and connected it to an opportunity: other GLAM communities had not yet developed a way to celebrate the upcoming 15-year anniversary of Wikipedia in January 2016. Inspired by the changing conversation about the role of Wikipedia in research and among libraries, the TWL team developed a campaign with the goal to develop increased literacy and understanding among librarians about how Wikipedia’s content is created and improved through verifiability, while generating awareness that other libraries are taking advantage of Wikipedia as an environment in which to further public programming. "Give Wikipedia the gift of a citation. Because facts matter #lib1ref" was seen widely throughout social media platforms.

The campaign’s first two years have proven to be quite successful. In 2016, there were over 29,000 views of the campaign page, coverage of the event in over 50 different venues (blogs, professional newsletters, etc.), over 1,100 Twitter posts using the hashtag, and at least 1,232 edits to Wikimedia projects. Though 1,232 citations barely scratches a dent in the number of citations needed for Wikipedia (English Wikipedia has over 300,000 “citation needed” tags), it did generate broad interest.¹⁷

In 2017, the campaign expanded by a factor of three to over 4,171 contributions in 18 languages, with continued positive press, and more events and support from local language Wikimedia communities.¹⁸ One particularly motivating story: the State Library of Queensland committed to and accomplished contributing 1,000 references during the campaign from among their staff.

This kind of campaign builds awareness and interest among the library community and allows for a dialogue that further shifts the Wikimedia community closer to the needs of libraries, and libraries closer to the goals of the Wikimedia community.

TWL, recognizing a need for persistent meeting and conversation spaces, has supported and helped develop two new venues to further dialogue between Wikipedians and Librarians: 700 members have joined the Wikipedia + Libraries Facebook group, and over 130 participants are signed up to the newly formed Wikipedia Library User Group. These fora spark regular mingling, noteworthy updates, and cross-pollination of ideas among Wikipedians and librarians, fostering a shared sense of identity and belonging to a community of practice around Wikipedia and Libraries.

The capstone of advocating for such mutually a beneficial and interconnected relationship came when TWL worked with the International Federation of Library Associations (IFLA) to publish two seminal white papers (<http://www.ifla.org/node/10871>): one on the opportunities for academic and research libraries to engage with Wikipedia, and a similar paper aimed at public libraries.

These papers outline multiple areas of potential collaboration. For example, Wikimedia projects

provide a venue to showcase cultural heritage resources in order to convey diverse perspectives to a diverse audience. Another path forward lies through structured data on Wikimedia's multimedia repository site Wikimedia Commons and the sister project Wikidata, which can enhance linkages between items and collections to support research across multiple semantic frameworks. The papers also express opportunities for professional development within library communities, in which Wikipedia editing skills can benefit a librarian's ability to grasp popular contemporary research practices, teach about digital information literacy and collaborative knowledge production, initiate community programs, and highlight their collections to the world.

Conclusion

*"The only thing that you absolutely
have to know, is the location of the library."
— Albert Einstein*

It's said that "discovery happens elsewhere."¹⁹ Less often said is that elsewhere is increasingly Wikipedia. As a top-5 website, Wikipedia is the sixth highest referrer to all DOIs online. With this position, The Wikipedia Library tackles the biggest challenges facing information professionals today: discovery, access, literacy, and participation.

Wikipedia's wealth of eyeballs means that it is an unparalleled opportunity for exposure and dissemination of content. Our goal is to make Wikipedia not an end point for research, but a starting point for deeper learning and research literacy—where Wikipedia leads its 500 million monthly readers back to information professionals, scholarly resources, and full texts.

For our editors, that means access to world-class library and reference services comparable to a leading university library. For our readers, who often do not have access to journals or databases, Wikipedia has become a ubiquitous gateway: not all information is free, but most information can at least be summarized and cited on Wikipedia—and we are working to make every citation lead somewhere full text can be obtained. With libraries and publishers, that means having their resources found and used through contribution and content production—as participants, as experts, as builders in an "intellectual makerspace", and as natural allies in the common humanitarian mission to share knowledge with the world and all of its people.²⁰

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