Supporting the Academic Research Needs of Incarcerated Students

Building JSTOR's Offline Solution for Prison Education

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About JSTOR Labs

JSTOR Labs has undertaken an ongoing endeavor to increase access to scholarly materials for incarcerated students through technology. JSTOR Labs works with partner publishers, libraries and labs to expand access to knowledge by creating tools for researchers, teachers and students that are useful, innovative, and spark curiosity and imagination. The team employs an agile, iterative, and user-focused approach that is inspired by the "design thinking" and "lean startup" communities. This approach has been used by the Labs team previously to create innovative tools like Text Analyzer,[1] which helps users to text mine a document in order to discover relevant scholarly writings, and to explore complex problem areas as in the Reimagining the Monograph[2] project, which sought to unlock some of the value lost in the transition from longform scholarship to fully digital by investigating and prototyping alternate ways of presenting scholarly argument.

JSTOR is a digital library with a mission to expand access to historical and educational materials, and provides access to more than 19 million academic journal articles, books, and primary sources in 83 disciplines. In 2021, JSTOR received 304 million unique visitors from 240 countries, attesting to the broad reach and relevance of this database across the globe. JSTOR Labs, often in partnership with libraries and archives, explores and develops new ways to discover, interact with and utilize this vast and varied collection for teaching and learning.

JSTOR and JSTOR Labs are part of the nonprofit organization ITHAKA, whose mission is to improve access to knowledge and education for people around the world. Our vision of a more equitable future for knowledge and education implicitly hinges upon expanding this access of diverse populations and communities of learners. JSTOR Labs' work is one part of an organization-wide program[3] aimed at supporting the needs of incarcerated learners. In addition to efforts to increase incarcerated students' access to academic resources, this program includes original research conducted by Ithaka S+R,[4] ITHAKA's research and strategic advisory group, to help guide programs and policies toward better academic outcomes for incarcerated individuals, and the American Prison Newspapers: 1880-2020 project,[5] which seeks to deepen public understanding of mass incarceration through digitization of hundreds of newspapers published in US prisons over the past 200 years.

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[1] JSTOR Labs Text Analyzer, www.jstor.org/analyze.
[2] Laura Brown, Alex Humphreys, Matthew Loy, Ronald Snyder, and Christina Spencer, "Reimagining the Digital Monograph: Design Thinking to Build New Tools for Researchers," *The Journal of Electronic Publishing* 21 Issue 1 (June 2017): https://doi.org/10.3998/3336451.0021.102
[3] "Improving higher education in prisons," *ITHAKA*, Accessed May 12, 2022, https://www.ithaka.org/initiatives/improving-higher-education-in-prisons/.
[4] "Ithaka S+R," Ithaka S+R, Accessed May 12, 2022, https://sr.ithaka.org/.
[5] "American Prison Newspapers, 1800-2020: Voices from the Inside," JSTOR, Accessed May 12, 2022, https://www.jstor.org/site/reveal-digital/american-prison-newspapers/?searchkey=1650652112521

Introduction

The opportunity to engage in an exploratory, self-directed mode of research is fundamental to a college education and to a student's development as a learner. The information literacy and critical thinking skills that are developed through self-directed research, including the ability to evaluate sources and explore a topic through multiple lenses, are the foundation of active learning and nuanced civic engagement. However, incarcerated students often lack access to the resources and conditions, both physical and digital, that make this kind of experience and opportunities for skill-building possible. Particularly, these students rarely have access to research databases, where they can scan and sift through relevant readings to identify texts most suitable—or intriguing—to their research projects and broader learning journey. Missing this kind of research experience has an impact not only on their academic success, but also leaves them without the fundamental information and digital literacy skills that are increasingly essential for survival in the digital era in virtually any workplace, field, or context. JSTOR Labs, an experimental product development team that aims to explore the future of teaching and learning, has been examining concerns of access to academic resources faced by incarcerated students and developing and testing solutions to meet their learning needs since 2007.

The many inequities between the academic experience on the inside and the outside are not only physical and spatial, but also less immediately tangible, including numerous restrictions on access to information and stark limitations on the means of conducting research. Though access to a law library is mandated by law,[6] the availability of an academic library is not guaranteed in prison systems.[7] The Landscape of Higher Education in Prison (2018-2019) report found that fewer than half of prisons responding to its survey reported access to an academic library.[8]

In addition to physical academic libraries, incarcerated students also lack access to digital research resources commensurate with what is available to students outside the prison system and in traditional university settings. Scholarly resources are notoriously difficult to provide across the higher education in prison (HEP) landscape for many reasons, including but not limited to the challenges of navigating differences across prison systems and varying media review protocols (standards and procedures for ensuring that materials allowed in prisons and jails meet the security standards of departments of corrections),[9] as well as operating within a security-centered climate in which opportunity for access to information can be perceived as occasion for its misuse.

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[6] *Bounds v. Smith*, 430 U.S. 813 (1977) established that "the fundamental constitutional right of access to the courts requires prison authorities to assist inmates in the presentation and filing of meaningful legal papers by providing prisoners with adequate law libraries or adequate assistance from persons trained in the law."

[7] Stephanie DeLano Davis, "Supporting Learning on the Inside: Academic Library Services for Students in Prison," ACRL 2017, (paper presented at ACRL 18th National Conference, "At the Helm" Baltimore, Maryland, March 22-25, 2017), https://alair.ala.org/handle/11213/17163.

[8] Caisa E. Royer, Erin L. Castro, Mary R. Gould, and Amy E. Lerman, "The landscape of higher education in prison 2018-2019," Alliance for Higher Education in Prison, 2020, http://higheredinprison.org

[9] Kurtis Tanaka, "Providing Library Services for Higher Education in Prison: An Interview with Jessica Licklider and Jeannie Colson," *Ithaka S+R,* January 5, 2022, https://sr.ithaka.org/blog/providing-library-services-for-higher-education-in-prison/.

Against this landscape, we have worked to bring JSTOR access to incarcerated learners since 2007, initially through an "offline index"—a searchable index of academic articles that students in prison without access to the internet could use, enabling discovery and delivery of articles that they needed for their coursework and research interests. In this paper, we describe our efforts, funded by the Mellon Foundation from 2018-2021, to design and implement a new, better version of the offline solution with greater functionality and research capabilities beyond that of an index. We hope that by sharing this work, we may provide tools and insights to others in the higher education in prison community who are seeking to provide greater access to information and resources to incarcerated people.

First, we provide an overview of our history working to create solutions to support research and learning in prisons. Next, we describe the steps taken, processes explored, challenges faced, lessons learned in creating the new offline solution. Finally, we lay out our plans to continue to seek solutions to improve the learning experiences of incarcerated students. One of our next steps will be to create a direct (online) access pilot of JSTOR for incarcerated students who have some degree of internet access.

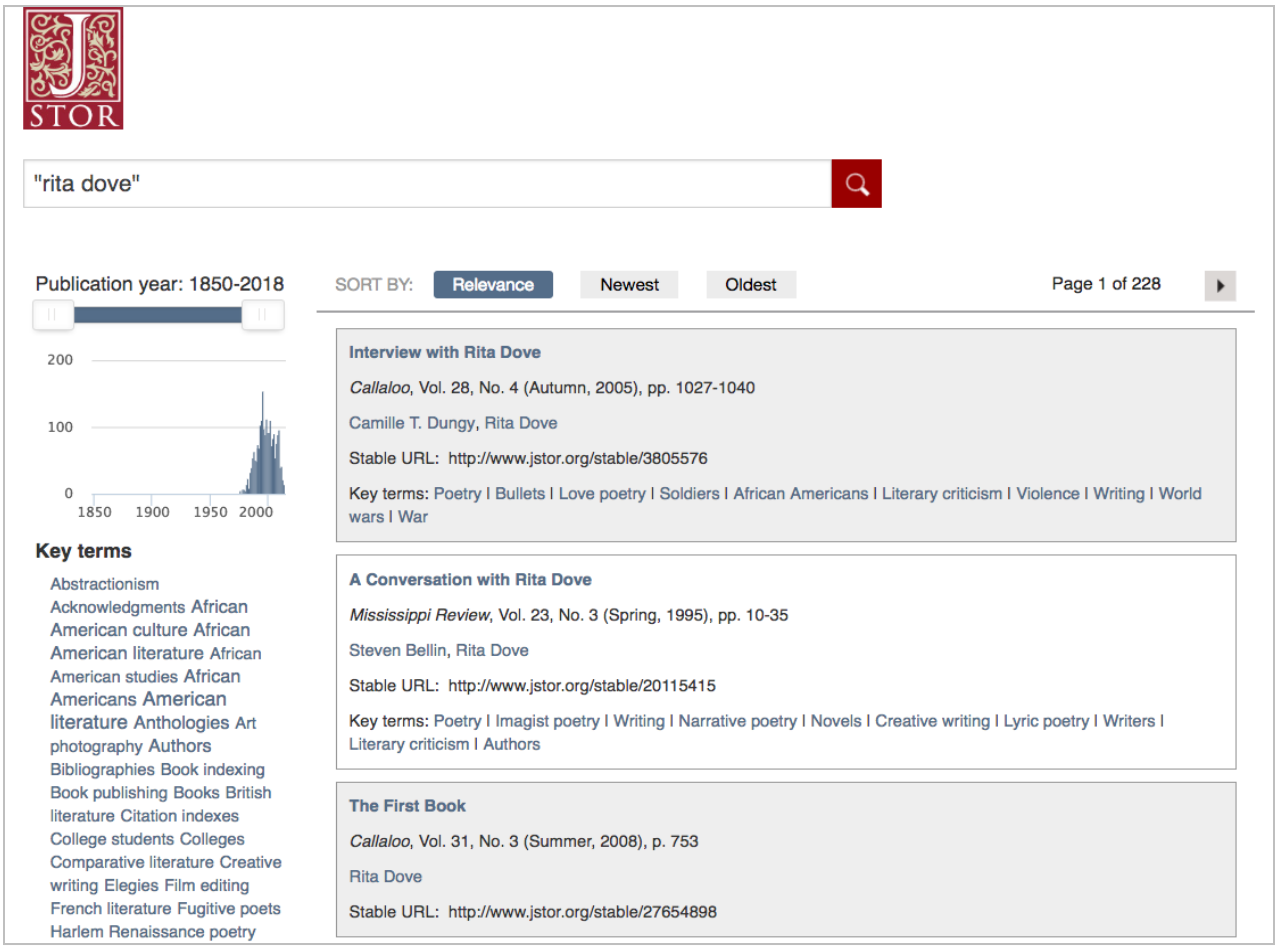

Figure 1: The original offline index allowed students to search JSTOR articles and request documents to be reviewed and delivered.

History of the Offline Index for Incarcerated Students

Over the past decade, JSTOR's engagement with rethinking ways of accessing and using scholarly materials has been applied to the learning needs of one of the most vulnerable and underserved student populations: the incarcerated. This work began in 2007, when the Bard Prison Initiative approached JSTOR with a compelling question: how might they extend Bard College's JSTOR access to their incarcerated students?

The primary challenge to providing JSTOR in prison was the lack of internet access: JSTOR is a digital database, but Bard's incarcerated students, like nearly all of those in prison education programs both then and now, did not have access to the internet.[10] Without internet access and a robust digital or even physical library, students were unable to gain crucial research skills or access quality scholarly materials for their coursework. JSTOR responded to this need by developing a searchable index of journal content that could be used in the prison environment, allowing students to search for all of the archive journal content on JSTOR—millions of academic articles—without an internet connection and request full-text copies of content from the affiliated institution.

The offline index was, in many ways, not ideal for students, teachers and administrators alike, and does not approximate full JSTOR access. Rather than providing full journal content, the offline index provides only basic information about articles, including the title, author, and when available, the article abstract. Installation of the offline index also proved arduous. To install and run the offline index solution, which came in the form of a web application and search server hosted on a USB thumb drive program administration staff would insert the USB drive into a computer port and run a start command from a terminal window. Though this initial version was designed for operation on computer configurations that were common at the time it was developed, as new computer architectures and operating systems became available to HEP programs, technical incompatibilities began to emerge. Many of these incompatibilities could be resolved via phone support but resolving technical issues became increasingly difficult over time, especially for HEP programs that had little to no tech support from either their campus or prison facilities

Once installed, the process of retrieval, designed to operate within prison constraints, proved circuitous due to the numerous actors and pathways involved. As a first step, after identifying relevant articles, students would then make a request to their program administrator such as a librarian or other staff, who would retrieve the article either in printed or thumb drive form at their academic institution. Once delivered to the prison, departments of corrections staff

reviewed the materials in accordance with their system's media review protocols. Upon approval,

[10] According to a 2013 survey of state correctional education directors, less than half reported that one or more of their prisons provided students with off-line access to Internet content and even fewer allowed restricted Internet access (Cited in Michelle Tolbert, Jordan Hudson, and Heather Claussen Erwin, "Educational Technology in Corrections, 2015," US Department of Education, 2015: 4, https://www2.ed.gov/about/offices/list/ovae/pi/AdultEd/policybriefedtech.pdf.) Though more recent data on the extent of internet access is not currently available, Ithaka S+R will soon launch a survey that will conduct a 50 state scan of the technology infrastructure currently available to higher education in prison programs.

the article was then delivered to the student, completing the flow from database to determined learner. This process could take between two weeks and up to three months—a timeline that aligned neither with that of a semester-long course nor with the deadlines of specific assignments—and required significant labor on the part of program administrators both on and offsite.

> The JSTOR offline index has been described as a major advancement for incarcerated students' abilities to conduct research.

Despite these complications, the availability of the JSTOR offline index has been described as a major advancement for incarcerated students' abilities to conduct research by administrators of HEP programs, who often struggle to provide academic resources to their students. Librarian Jeannie Colson at Lee College characterized the project as "rushing into the 20th century from the dark ages" (note that we have yet to enter the 21st century in this estimation, indicative of the further challenges and limitations that lie ahead). David Malone, dean of the college & seminary library at Calvin College, called the JSTOR offline index the "linchpin of the students' access to academic content."

Following the offline index's initial success, over the next decade JSTOR received additional requests from HEP programs to use it. Though this was a sign of the pressing need and demand for such a tool, there was at this point no way to scale the solution for use in multiple contexts. Given the tool's genesis as a solution designed for one program (Bard), the laborious manual installation process required and questions as to the limitations placed on available content based on program need and media review restriction, it was unclear how we would be able to deliver it to additional programs and students.

In 2018, ITHAKA received funding from Mellon Foundation to pilot a second generation of the offline index that would resolve the aforementioned technical and service problems and undertake research on the barriers that HEPs face when attempting to deliver high-quality library resources in prison educational contexts. JSTOR Labs led the technical prototyping and pilot, while Ithaka S+R conducted and disseminated foundational research.[11] This joint project sought to make a large swath of the published scholarly literature in JSTOR available for use in prison education, empowering students to learn how to conduct independent research and supporting faculty to design and teach courses in prisons.

Designing the Offline Solution

JSTOR Labs' goals for this project were manifold and interwoven: to design and build a new version of JSTOR's offline solution for prison education; to test it in multiple, diverse programs and facilities; and to use that data to make a recommendation to scale the solution. Our design

[11] Ithaka S+R, a service of ITHAKA, specializes in research on educational impact, policy, and scholarly communities, published a report on the HEP landscape in 2019. See: Rayane Alamuddin, and Danielle Cooper, and Meagan Wilson, "Unbarring Access: A Landscape Review of Postsecondary Education in Prison and Its Pedagogical Supports," *Ithaka S+R,* 30 May 2019, https://doi.org/10.18665/sr.311499.

process, conducted over the course of 2018-2019, took multiple phases utilizing different methods such as design thinking, user research, and iterative prototyping. Applying these methods to meet the goal of designing and testing an offline version of JSTOR for prison education required some adjustments to our usual approach. In this section, we will walk through the overarching process and steps we followed, accounting for the unique challenges of this project.

Understanding the Prison Education Landscape

While JSTOR had been supporting some prison education programs for a decade when the effort to create a new version of the offline index began, this larger-scale project required a more thorough understanding of the unique needs and technological barriers faced by incarcerated learners. In order to design a successful new instantiation, we took a three-pronged approach to better understanding this complex terrain: 1) reviewing the current landscape of higher education in prison programs 2) conducting qualitative user research), and 3) convening an advisory committee of experts in higher education in prison to guide us as we sought to develop our solution.

To begin, Ithaka S+R examined the lack of access to and information about postsecondary education in US prisons and surveyed extant literature on education systems, student needs and outcomes in prisons.[12] Their findings, published as “Unbarring Access: A Landscape Review of Postsecondary Education in Prison and Its Pedagogical Supports” were instrumental in helping JSTOR Labs to understand the challenges faced by educators and students, as well as the solutions currently in use.

Second, JSTOR Labs informed our project through first-hand accounts of the prison education experience. We conducted a series of semi-structured, one hour-long interviews via phone exploring lived experiences and perspectives of formerly incarcerated students, faculty, and librarians. Interviewees, located in Texas, New York, and Washington State, were identified through referrals from our advisory committee and through our existing networks with librarians and HEP instructors, and comprised a mix of people who both had and had not used the JSTOR offline index.

The students we spoke to had been recently released from prison. Ideally, we would have spoken with currently incarcerated students as well, but this was not possible due to prison restrictions on communication.

Our interview approach, informed by the design thinking method which embraces a non-linear, iterative, and empathetic process to understand the experience of the end user, sought to identify

[12] Alamuddin, Cooper and Wilson, "Unbarring Access: A Landscape Review of Postsecondary Education in Prison and Its Pedagogical Supports."

the needs and problems of different JSTOR user groups: students, librarians and teachers.[13][14] Formerly incarcerated students identified numerous barriers such as the demands of full time jobs and having few, difficult to access, or insufficient scholarly resources and technologies. As one former student remarked, "[The library is] fifth grade level academic with no computers." Another spoke to the level of self-determination and tenacity required in order to access what few materials were available: "We got materials however we could . . . We had to fend for ourselves."[15]

We assembled our advisory committee guided by the necessity to include perspectives of those who have direct experience with and expertise in the educational landscape within prisons. We are grateful to have had the support and insight of the following advisors on this project:

- Elias Beltran, Graduate student, Cornell University, and graduate of Bard Prison Initiative
- Erin Castro, Director, University of Utah Prison Education Program
- Brian Fischer, Former Commissioner of New York State Department of Corrections
- Lakeisha Hamilton, Freedom Education Program Puget Sound (FEPPS) Education Advisory Councilwoman and graduate of FEPPS
- David Malone, Dean of College & Seminary Library, Calvin College Prison Program
- Rob Scott, Executive Director, Cornell Prison Education Program
- Brian Walsh, Senior Program Associate, Vera Institute of Justice

[13] For more on methods used by JSTOR Labs, see: "Our Recipe: JSTOR Labs' Process for Discovery Projects," http://labs.jstor.org/blog/our-recipe-jstor-labs-for/.

[14] Although the design thinking method helped us to shape an understanding of the people we were ultimately designing for, we knew that the method had limitations in its model of empathy, and has in recent years met well-warranted critique. Without continued involvement from the people for whose use we were designing the offline index, an empathetic understanding produced via this method could ultimately, however unintentionally, be disingenuous and paternalistic, speaking for a community from without. We thus prioritized the involvement of formerly incarcerated students throughout the project, by ensuring student participation on our advisory committee and seeking feedback from students throughout the project to complement and expand upon our user research.

[15] Interview with incarcerated student, May 19, 2014.

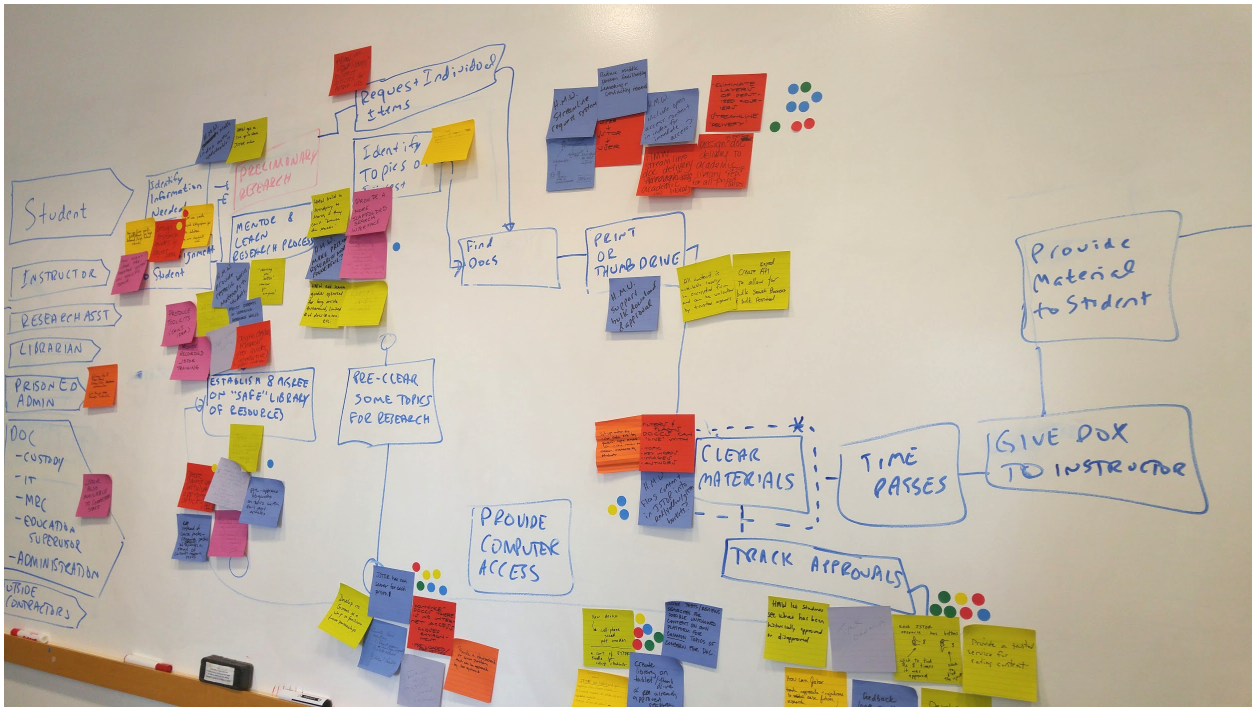

Figure 2: During the advisory committee meeting we mapped the pathway of an incarcerated student getting research materials using JSTOR's offline index and brainstormed ways to improve that experience.

When this advisory committee met in ITHAKA's offices on July 24, 2019, we reviewed Ithaka S+R's landscape analysis, set strategic objectives for the project, and explored and prioritized interventions JSTOR could make to provide scholarly materials to incarcerated learners. We also discussed and prioritized qualities to look for when selecting our test cohort of HEP programs. The advisory committee emphasized the importance of working with already established, regionally accredited programs, as the offline index could meet the research needs of these programs. Furthermore, having previously built a strong and trusting relationship with their Department of Corrections, these programs would likely have greater ability to implement a new system quickly. Outside of these criteria, advisors foregrounded the necessity of having a diverse test cohort that would represent different states, different types of degrees granted by the program, men's and women's facilities, various levels of available technology, and programs that had and had not used the previous offline JSTOR solution.

With this guidance, we began to meet with HEP programs and select our test cohort. After a two-month long process of interviewing potential candidates, we invited the following programs to participate in the pilot:

- Calvin Prison Initiative, MI
- Cornell Prison Education Program, NY
- Freedom Education Project Puget Sound, WA
- Mt Tamalpais College (formerly Prison University Project), CA

- NYU Prison Education Program, NY
- Stetson University Community Education Project, FL

This cohort represented several geographical regions and programs operating in men's and women's facilities, all of whom were prepared to implement the offline solution in time for the Spring semester of 2020.

Constraint-storming not Brainstorming

Before our cohort could implement the offline solution, however, JSTOR Labs had to design and build it. Three months after the advisory committee meeting, in October 2019, representatives from each of the test cohort programs attended a one-day workshop at ITHAKA's office.[16] Each program sent representatives who could speak both to the program administration and to their particular technical constraints. Together, we conducted a series of activities that would help us arrive at a solution that would work for each program and their students.

> We realized that the real work on this project was not imagining new systems but instead exploring ways to work within the set of constraints programs and students operate under. This wasn't brainstorming as we knew it—it was constraint-storming.

It is worth pausing to note how the approach we took with our cohort differed from what JSTOR Labs has typically employed when developing other projects.[17] Our approach to product development usually seeks to answer four key questions: 1) Does the target user want it (desirability)? 2) Can we build it (feasibility)? 3) Have we built this in a way that users understand (usability)? and 4) Is it a sustainable solution? (viability). We regularly convene partners and stakeholders for collaborative design-oriented workshops to explore these questions, sometimes called "design jams."[18] The activities conducted in these sessions vary, but the tenor of the activities is one of opportunity: we are seeking ideas that might delight our target user. While the question of feasibility of solutions does come into play, it is not usually the central concern of the inquiry at hand. As we prepared for this workshop in support of prison education, however, we realized that the real work on this project was not imagining new systems but instead exploring ways to work within the set of constraints programs and students operate under. This wasn't brainstorming as we knew it—it was constraint-storming.

Though it was evident that what we sought to provide with the offline solution (access to scholarly materials to higher education students) was desirable and useful—even delightful!—to students and programs alike, the focus of our product design work instead needed to be on the feasibility of the solution and overcoming the barriers to providing a quality solution. In other words, what we *couldn't* do was a larger design consideration than what we *might* do.

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[16] One program, NYU, was unable to attend the session but was still able to participate in the test cohort.
[17] "Our Recipe: JSTOR Labs' Process for Discovery Projects," http://labs.jstor.org/blog/our-recipe-jstor-labs-for/.
[18] For example, this video captures the work and output of one such session dedicated to tools in support of Public Health researchers: https://www.youtube.com/watch?v=aTGpOfle21c.

There were three key findings that arose during the design workshop. First, we learned that while each program operated under a large number of constraints, these were not all the *same* constraints. To pick just one example, some programs were forbidden to use thumb drives to bring materials into the facility, while other programs worked at facilities where thumb drives were the only permissible technology.

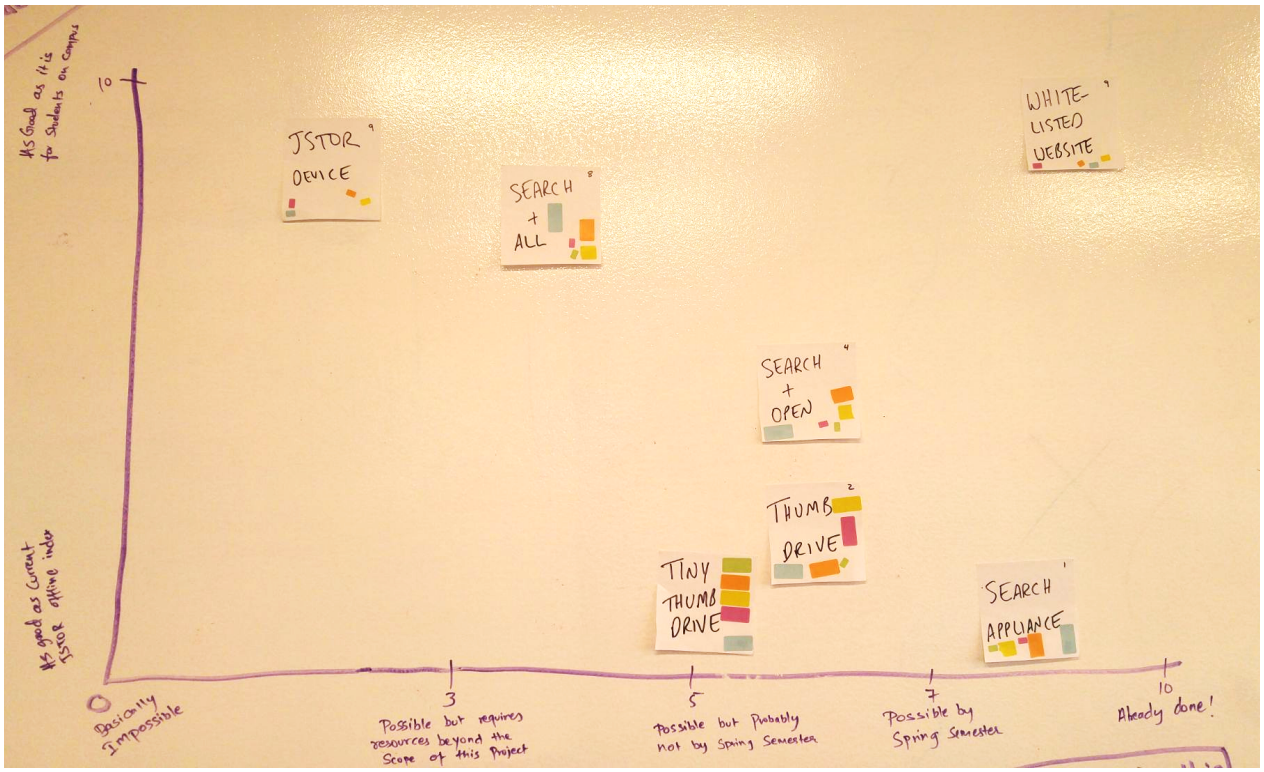

Figure 3: At the design workshop with test cohort pilot programs, we assessed possible approaches using two criteria. First, how easy is this for JSTOR to build, on a scale from impossible to already achieved? And, how is the research experience for students?

Second, while simply providing "whitelisted" direct access to JSTOR was the easiest to develop and provided the best student experience,[19] not one participating program could actually implement it, effectively taking that approach off the table.[20] Last, while only one solution—making small, configurable thumbdrives—fully met the constraints of each program, this approach was no programs' *preferred* solution, and there was very little agreement across programs as to their preferred solutions. This meant that either we would have to choose an approach that did not meet the needs of every program, or we would have to offer multiple solutions in order to reach as many students as possible.

[19] "Whitelisting" is a cybersecurity strategy in which a list of IP addresses, domain names or applications, is approved, while denying all others.

[20] Some states are beginning to explore direct internet access, a nascent trend that the pandemic has accelerated. With funding from the Ascendium Education Group, we have initiated a second, related project to explore this approach.

Building the JSTOR Offline Solution

Informed by the workshop with our test cohort of HEP programs, we laid out the following design criteria for the next generation of JSTOR's offline index for prison education, criteria to ensure the highest possibility of success for our solution:

1. *Adoptability: Our solution needed to work for all of our test cohort programs.* One salient theme of the workshop was the number and diversity of constraints that programs operated under, which we suspected would be the case as we scaled our solution for use by other programs. To meet our long term goal of making JSTOR easily available for all HEP programs, we would need a solution that worked across them all, beginning with the test cohort.

2. *Quality Student Experience: Our solution's design needed to provide a student experience as close as possible to what is seen by their counterparts on the outside, while still working within and accommodating the many constraints on learning in a prison environment.* Learning research skills is a vital element of post-secondary education, and we sought to replicate how students on the outside gain research experience, so that skills learned on the inside could be as transferable as possible when a person transitions back into society post-release.

The interplay between these two criteria drove our fundamental design direction. Because none of the cohort programs operated in facilities where internet access was permitted or even being considered at the time, we were unfortunately unable to opt for the solution that would be most ideal for students—that is, creating a version of JSTOR that departments of corrections could approve direct internet access, e.g., "whitelisting" JSTOR.

Working within these constraints, over the next four months, the Labs team designed and built an offline solution that could be used by programs in multiple ways, allowing them to provide as much access as their specific circumstances allowed.

Solution Overview

Unlike the first instantiation of the offline index which came in the form of a thumb drive, the new JSTOR offline solution was sent to participating programs on a server. This change in delivery format, we hoped, would allow for a more "plug and play" experience for HEP programs, avoiding the compatibility challenges faced previously. While providing more storage, a server would also allow us more flexibility regarding how it might be deployed since it could be a standalone solution, rather than being dependent on installed hardware.

Figure 4: These small servers, measuring 3-4 inches to a side, host the JSTOR offline solution.

We selected Intel NUC servers using a customized version of Linux.[21] NUCs provided the configurability and power we required while being small in size, an important consideration

[21] A NUC (Next Unit of Computing) is a small form factor PC from Intel. The NUC devices used for this project are configured with Arch Linux, a small and flexible distribution of the Linux operating system.

given the space constraints most programs faced. These servers, affixed with JSTOR stickers, can support upwards of 10 TB of storage, sufficient for the application, the full JSTOR search index, and the PDFs for all open access JSTOR journals and books content.

Once built, these servers housed a set of content and software, including the JSTOR search index, some full-text JSTOR content, a web server, and a web application supporting both students and administrators. Programs could use this material in one of two ways. Most of the pilot programs had networked (but not internet-connected) computer labs where students did their academic work. For these programs, the server might be plugged into this same local area network, where students would access it from a web browser on any of the computers in the lab. Roughly half of the pilot programs intended to use the offline solution in this locally-installed mode.

The other half of the programs, however, could not introduce a new server into their facility. These programs could use the device in its second mode: as a configuration engine, which could be installed offsite and used by program administrators to generate new thumb drives containing a new version of the offline solution. These thumb drives, customized with specific slices of included content, could in turn be installed onto laptops or desktops inside the facility.

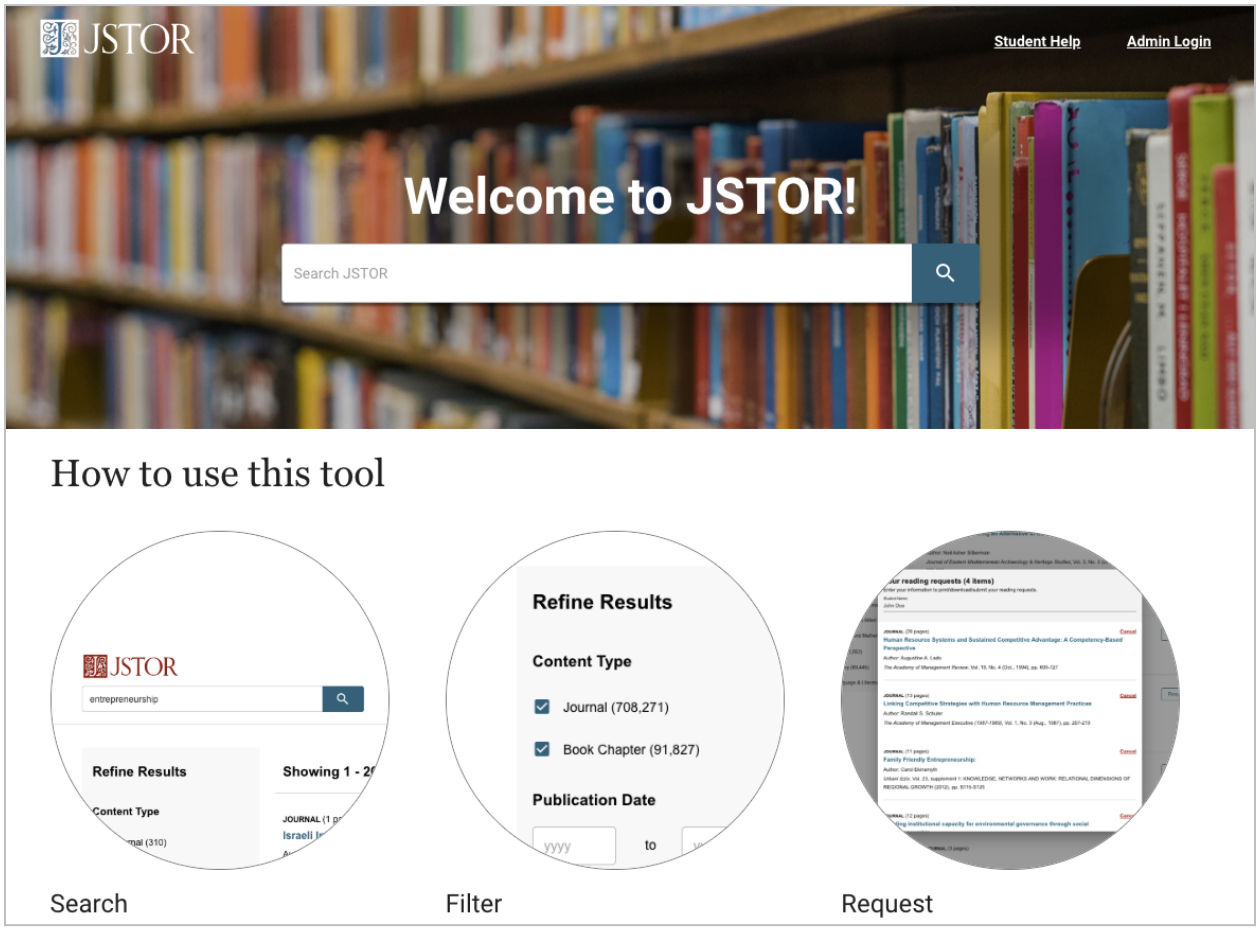

Figure 5: The home page for students using the JSTOR offline solution.

We endeavored to make the student experience of offline JSTOR as similar as possible to that of students on the outside. To do that, we presented students with the same JSTOR search and discovery experience as users outside encounter, including the same search bar, filters by content type and discipline, and (when available) abstracts. Given restrictions on the content that incarcerated students are able to access, we incorporated existing media review workflow administration into this system.

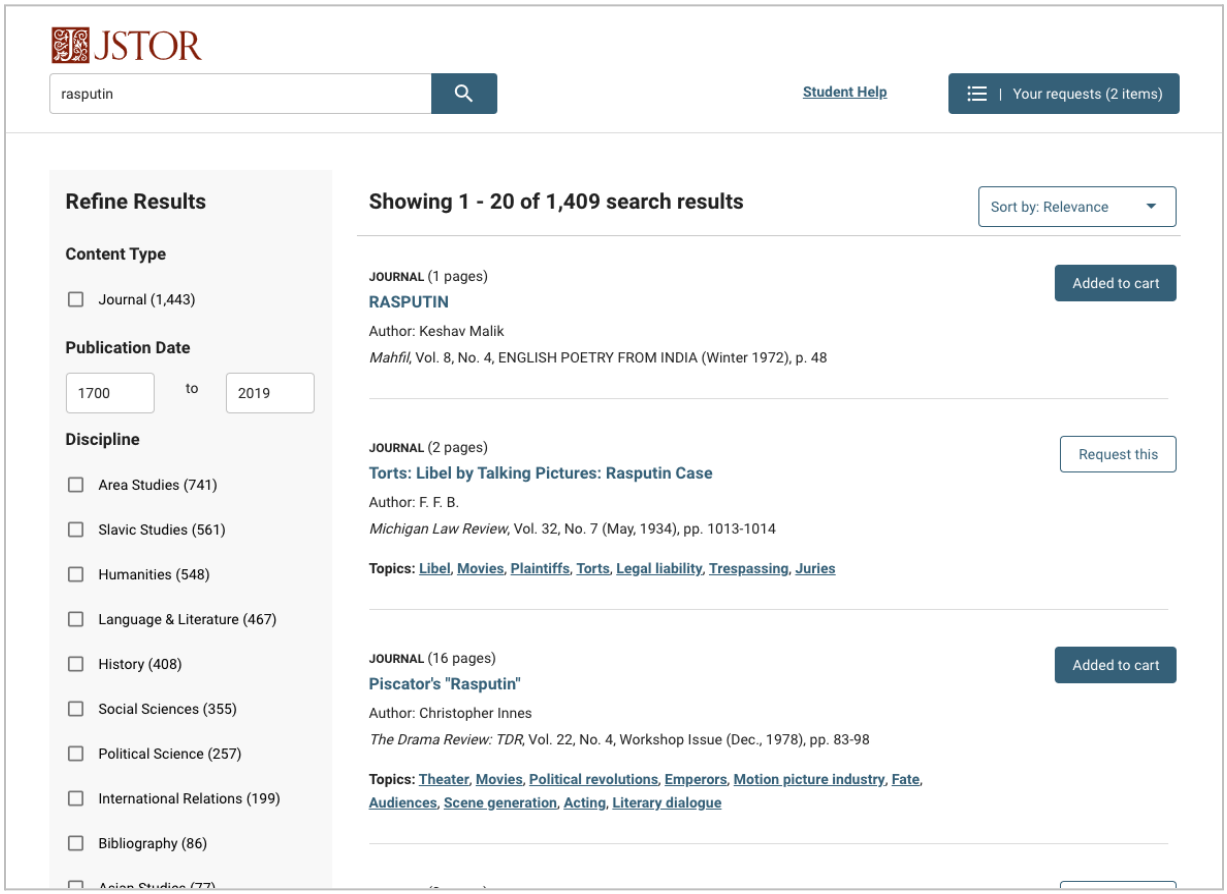

Figure 6: The JSTOR search interface was designed to have a similar user experience to that students on the outside encounter.

Students conduct keyword searches on the entire JSTOR database, but they are limited to seeing the title, author, abstract, and bibliography metadata, rather than the full text. If the student wishes to view an article, they request it. These requests then appear in a program administrator's queue for review. If the article is approved by an administrator, the student can gain access to it. If the full text PDF of the article is available on the device, this access is immediate; if not, administrators will need to go offsite, retrieve the article and return it to the facility and student. To ameliorate the laboriousness of this process, we built in tools for administrators, such as an export function of links associated with requested articles into a .csv file, so that they may more easily find and retrieve the documents once offsite.

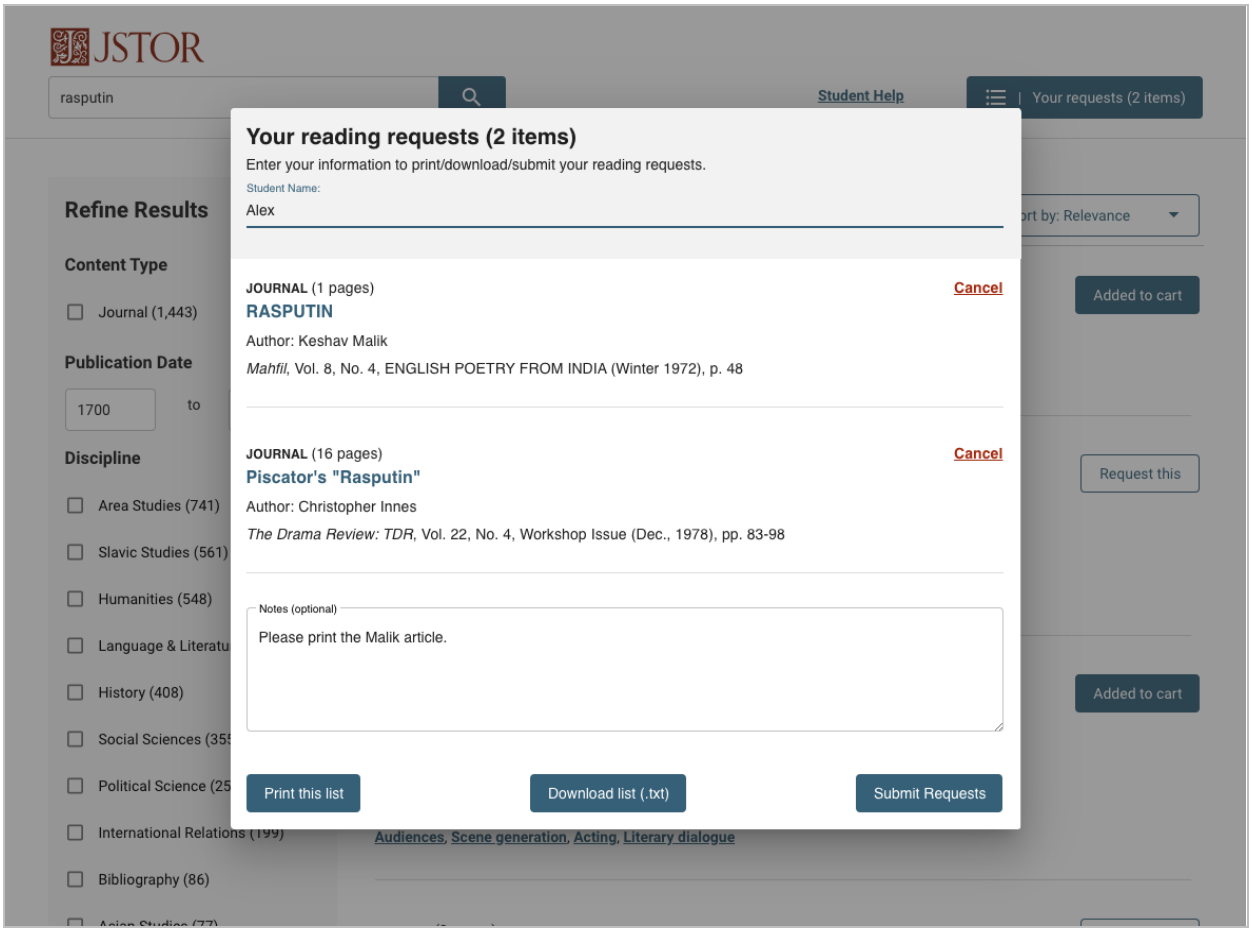

Figure 7: When a student finds material they want for their research, they can request it.

At this writing, the offline index servers contain the full text of JSTOR's open access content, roughly five percent of the entire corpus. When students request articles that are open access, administrators can provide immediate access, whereas rights-restricted content, due to agreements with publishers, must be retrieved from an internet connection, rather than stored on an unsecure external device. To optimally meet the needs of students, all of JSTOR's content would need to be included on the local server, making the time for fulfilling requests of articles, if previously approved, a matter of minutes. As part of JSTOR Labs' subsequent developments to this project, we have been working to be able to provide expedited access to rights-restricted content to incarcerated students through an online version of this system.

Though primary use of the offline solution happens offline, the solution is built so that it can retrieve and implement updates when connected to the internet. When connected to the internet, the device automatically retrieves updates to both functionality and content. This ability to make updates to the device via an internet connection ensures continued maintenance of and improvements to the system moving forward. If the device is implemented inside the facility, we

hope that it can be updated once or twice a year, given facility or program staff ability to conduct this update.[22]

More about the architecture of the offline solution can be found in the Appendix.

Student and Teacher Guides

> The digital divide between students on the inside and outside makes the opportunity for incarcerated students to experience a research database like JSTOR all the more valuable, but it also means that students and teachers in prison settings may need more instructional supports.

Research skills and digital literacy can be daunting for students to develop even under the best of circumstances. Developing these skills within carceral settings is even more challenging, exacerbated by the overall lack of experience with technology. The digital divide between students on the inside and outside makes the opportunity for incarcerated students to experience a research database like JSTOR all the more valuable, but it also means that students and teachers in prison settings may need more instructional supports to encourage development of these skills. To that end, JSTOR Labs wrote two extensive guides to using JSTOR which are included on the NUCs:

1. *Student Guide:* The student guide provides a description of JSTOR and features an illustrated guide for conducting research using the offline solution.[23] This illustrated guide includes extensive instruction on conducting academic research using keywords, syntax, and Boolean operators. The student guide also presents a thorough training in the basics of academic research, including formulating a search strategy, assessing sources for currency and credibility, citing scholarly works, and managing a bibliography.
2. *Teacher Guide:* The teacher guide provides a set of classroom exercises intended to help a class build the skills described in the student guide, including how to conduct searches, analyze the credibility of sources, and cite sources.[24]

Material in the student and teacher guides was adapted from JSTOR's Research Basics online course, a free resource created to familiarize students with basic research concepts needed for success in school.[25]

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[22] More frequent content updates would be welcome and could be possible in partnership with prison IT, but given that JSTOR content primarily consists of back issues of academic journals, intermittent content updates are unlikely to greatly diminish the value of the database to students.
[23] "About the JSTOR Offline Index," JSTOR Prison Education Documentation, https://ithaka.github.io/PEP/site/students.html.
[24]"Classroom Exercises," JSTOR Prison Education Documentation, https://ithaka.github.io/PEP/site/activities.html.
[25] "Research Basics: an open academic research skills course," JSTOR, https://guides.jstor.org/researchbasics.

Testing and the Impact of COVID

The incarcerated population experienced some of the earliest and most devastating effects of the COVID-19 pandemic. The impact of this historic and ongoing pandemic on people in prison cannot be overstated: existing prison conditions such as overcrowding, limited access to hygiene and sanitizing products, lack of and in some cases denial of medical services, coupled with an inadequate, disorganized public health response wrought dire consequences within prisons. In the US, the incarcerated population experienced infection and death rates from COVID-19 at a rate higher than in the community outside; in 2020, COVID-19 cases in prison were five times higher, and the death rate three times higher than in the general population.[26] When lockdowns were implemented, they led to a level of isolation that negatively impacted the mental health of incarcerated people, a population that already experiences mental illness at a higher rate than the general population.[27]

No part of life, and especially life within prisons, was left untouched by the effects of the pandemic, including education. The pandemic greatly interrupted and reshaped the broader landscape of higher education in prison that our work is situated within, including many of the assumptions that informed our approach.

Like most higher education in prison programs, those taking part in our pilot were forced by the pandemic to suspend much of their activity. Prior to the pandemic, designing and building the next generation of the offline index took the team roughly four months starting in November 2019. In February 2020, we held training and review sessions of the solution with our pilot programs, and at the beginning of March 2020 we began to build the programs' NUCs and ship them out. We made plans with programs for implementation at their facilities, and for gathering student and program feedback while they tested the solution throughout the spring semester. These plans were quickly reshaped by the harsh changes wrought by the pandemic.

With facilities largely in lockdown, students were unable to gather in groups and lost access to computer labs and other educational spaces. Programs were unable to teach in person, although a few of our pilot programs were able to shift to teaching by mail correspondence. Unsurprisingly, none of the pilot programs were able to even consider working with their facilities to implement new hardware like our offline solution. In effect, our project was put on hold until implementation would become possible.

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[26] Massimiliano Esposito, Aldo Liberto, Federica Ministeri, Nunzio Di Nunno, Monica Salerno, and Francesco Sessa, "The Risk of COVID-19 Infection in Prisons and Prevention Strategies: A Systematic Review and a New Strategic Protocol of Prevention," *Healthcare (Basel, Switzerland)* 10, no. 2 (January 29, 2022) : 270 https://doi.org/10.3390/healthcare10020270;
Alexandria Macmadu, Justin Berk, Eliana Kaplowitz, Marquisele Mercedes, Josiah D Rich, and Lauren Brinkley-Rubinstein, "COVID-19 and mass incarceration: a call for urgent action," *The Lancet* 5, no. 11 (November 1, 2020): E571-E572, https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(20)30231-0/fulltext;
"Prison COVID-19 cases five times higher and prison COVID-19 death rate three times higher than general population," *Johns Hopkins Bloomberg School of Public Health,* July 8, 2020, https://publichealth.jhu.edu/2020/covid-19-cases-and-deaths-in-federal-and-state-prisons-significantly-higher-than-in-u.s.-population

[27]Thomas Hewson, Jake Hard, Jennifer Shaw, and Andrew Shepherd, "Effects of the COVID-19 pandemic on the mental health of prisoners," *The Lancet Psychiatry* 7, no. 7 (July 2020): https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7302764/

Finally, over a year after the pandemic had taken root in the US, in May 2021, Stetson University's Community Education Project was able to install the NUC to support their students at Tomoka Correctional Facility in Daytona Beach. Stetson installed the server within the facility, with students accessing it on their local area network to conduct their research.

At this writing, we have provided either the NUC or a USB storage device derived from the NUC to all of our pilot programs, as well as to an additional four programs who have reached out to us since our pilot project began. Unfortunately, most of these programs have failed to implement the solution, for a tangle of interconnected reasons. First, prisons and the higher education programs that operate within them remain beleaguered by the pandemic, making the introduction of any new hardware difficult or simply not a priority, when some programs are fighting to provide any instruction at all. Second, while we had aimed for our server to be simple to install and administer, we had also created a system that could support multiple modes of use (i.e. installed within the facility, or used to create thumb drives on the outside, which could in turn be brought into the facility). This created complexity that required a level of technical acumen to which few HEP programs have access.

Even as we waited for the pandemic to ease enough to ensure greater safety and well-being, and to allow our project to move forward, always with the goal of providing incarcerated students with access to research resources as quickly as possible, the higher education landscape we were working within had rapidly transformed before our eyes. The cessation of in-person education coupled with the dramatic shift to online learning in non-carceral settings opened a door that had previously been closed: providing limited internet access inside of prisons.[28] At our convening of pilot programs back in October 2019, the idea of direct access to JSTOR, or to a version of JSTOR which departments of corrections could approve access to ("whitelisting"), had been identified as the best possible solution both for students and JSTOR, but entirely an impossible one. None of our participating programs could at the time consider an online solution and few others in the community were exploring it. A year later, however, the landscape had changed drastically, making a direct access solution, formerly explored in theory, now possible in practice.

Building on our years of experience developing and piloting offline solutions and forming relationships across the HEP community, we launched a second project, funded by Ascendium Education Group, to create and pilot a secure online version of our solution to which students could gain direct access.[29] By 2021, the number of states contemplating or working towards limited internet access had far exceeded our most optimistic projections; we count over twenty states working towards direct access, and we are in conversations with many of them. While outside the scope of this paper, this second project has proceeded in parallel to the first, optimizing for maximum reach to programs regardless of their technical capabilities. While this project is still underway, we are optimistic that students accessing a secure cloud-hosted JSTOR

[28] Kurtis Tanaka, "How Will Postsecondary Education in Prisons Need to Change in Light of COVID-19?" *Ithaka S+R,* May 7, 2020, https://sr.ithaka.org/blog/how-will-postsecondary-education-in-prisons-need-to-change-in-light-of-covid-19/.
[29] Alex Humphreys, "Providing Secure Online Access to Incarcerated Students: New Project Announcement," *JSTOR Labs,* October 19, 2020, http://labs.jstor.org/blog/hep-online-announcement/.

will be both viable and desirable in numerous states and facilities, and more in the future as access to the internet becomes more widespread. While the pandemic has increased DOC interest in providing internet access, and some have been able to move quickly to provide it, broad access to the internet will likely take several years to implement and require significant changes in technology infrastructure, DOC culture, and in some cases, legislation.

Assessment and Analysis

In the summer of 2021, JSTOR Labs solicited feedback via a handwritten survey from students in the Stetson program, who had been able to use JSTOR during their spring semester. Since Stetson had been one of the programs who had used the previous JSTOR offline solution, the survey asked how the new system compared to the old. We received three responses out of about 10 students who had used the system. Though we wish that we had received more, the three that we received showed enough alignment to identify some common themes. Primarily, in the students' view, the new system represented an improvement over the previous system in a few significant ways, beyond the simple expansion of the JSTOR corpus that came with updating the database. First, the media review and request workflow made their experience more streamlined and less manual. Previously, students would have to write down by hand the articles they sought; with the new system, they only needed to click a button or two to make requests for articles. Second, the immediate availability of the open access content, once approved, was appreciated by many, although this excitement was tempered by the relatively small percentage of content actually available.

There were a number of suggestions as well for improving the system. In addition to highlighting a handful of bugs which have since been addressed, the most emphatic request was to include not just open access content on the server but all JSTOR content. They also requested tutorials and help conducting complex searches and better support for search within a result set. Finally, they requested that JSTOR expand its available article coverage to new and additional topics.

Understanding the experience of the students using the system is vital to being able to meet their research needs, and we are grateful to have students' input and have already made some changes to the system based on their feedback. Unfortunately, far too few students have been provided with access to the new solution, stymying both students' ability to conduct academic research and our capability to improve and expand our solution. That only one of nearly ten programs with access to the solution were able to implement is indicative of problems of access faced outside of the student experience—in external departments like IT—pointing toward the arduous and interconnected work that needs to happen in order to implement the system.

While it is difficult to disentangle the challenges implementing the devices with the broader challenges of access and staffing caused by the pandemic, it is clear that there is still work to do to achieve our goal of providing a simple "plug-and-play" solution to access JSTOR. During our pilot, administrators struggled to do the technical administration needed to set up the offline solution, for example, to identify the IP address of the device, a step required for administrators and students to access the application. When we sought to troubleshoot problems encountered by pilot programs, our efforts were complicated by the nature of the system: since this is a device that needs to operate offline, we couldn't depend on access to the system through our internet

connection or explore problems remotely. Instead, we were reliant on local administrators to act as our eyes and ears (and hands). When installing the offline index inside facilities, troubleshooting was further complicated by the lack of access to communication on the inside. At Tomoka Correctional, implementation was delayed because technicians encountered a problem but did not have access to a phone until they left the facility, making them unable to call us to diagnose the issue onsite; they then needed to wait a week, until their next site visit, to properly resolve the problem.

These hurdles, however onerous, are surmountable, but overcoming them requires time and effort on the part of the HEP programs, who were under-resourced even before the pandemic. Under the circumstances of the past two years of the pandemic, these challenges have been substantial.

Next Steps

The world in which we designed the offline solution is different from the one that we sought to implement in, and our next steps to further our work providing access to JSTOR for incarcerated students reflect this transformed terrain.

1. Provide a direct access version of JSTOR for incarcerated students (currently piloting).

Providing students access to a version of JSTOR that can be whitelisted creates a better experience for the students that most closely matches that of students on the outside. It is simpler for departments of corrections and HEP programs to administer and maintain, and it is far more efficient for JSTOR to manage, making it easier to create a sustainable service that is free to use. We have launched a pilot program designed to probe and overcome the many potential challenges of providing an online solution, such as creating a media review process that encourages access to materials, is customizable to different DOC standards, and is not overly labor-intensive.

2. Explore the creation of a simpler "skinny" offline approach.

As we encountered over the course of our project, when creating an offline solution for incarcerated settings, a strong tension can emerge between desirability and viability: the desire to create a great and equitable student experience forces complexity into the system. This in turn makes it more difficult to implement. If a solution cannot be implemented, no matter how remarkable it could be, it is not a great student experience. So as not to let the great be the enemy of the good, we should explore the creation of a simpler offline solution, one that might more closely resemble the search index of our first iteration. This should not be difficult for JSTOR to create, and the goal would be for it to be easier for programs to implement. This approach could be used by programs as a temporary stopgap while facilities explore and expand internet access.

3. Continue to develop a variety of approaches for providing library resources to HEP students.

The experience of this project has affirmed our early observation that there is not one single solution that will be able to overcome the diversity of constraints faced by all HEP programs and

their students. We maintain our position that a variety of solutions will be necessary in order to reach as many students as possible. Happily, direct access solutions which previously had seemed inconceivable now appear to be among the options. For offline access, we believe that multiple options for delivery may be needed. In some cases, a "skinny" thumb drive-like solution may be a best first step. In others, a more robust solution with more storage capability and functionality may be a better fit.

4. If facilities require a locally hosted server, develop support for rights-restricted full text.

Depending on how widespread direct access becomes, it is unclear yet whether there will be sufficient need and, importantly, support for heavier-weight solutions, like the one built on the NUC design implemented on this project. If sufficient need for that remains, then for the NUC design implemented on this project to achieve its fully realized vision and value to students, we will need to add rights-restricted full text PDFs so that students can gain access to their research materials more quickly. To do this and still protect the intellectual property of the rights-restricted content in JSTOR, we will need to encrypt the files and ensure that only readers accessing the files via the web-application on the server are able to decrypt and read the files.

5. Proceed with these interventions with deep awareness of the broader landscape of technology in prison.

Issues of access to academic resources in prison must be situated within a larger technological context of sparsely available—and sometimes predatory, rent-seeking—device options by which these materials can be delivered.[30] While technology promises to increase access to online resources, it also gives rise to a minefield of concerns such as threats to privacy and increased surveillance, as well as the potential for displacement of in-person teaching instruction at reduced cost for institutions. Providing an alternative to for-profit models in the technological landscape of higher education in prison is a necessary step to ensure that students have more equitable and quality access to information resources without exploitation. The recent reinstatement of Pell has begun to reveal an opportunity for for-profit entities to capitalize on this opening for providing educational research and tools.[31] Our organization intends to provide a freely available and accessible resource to incarcerated students, and we encourage other digital libraries providing educational materials to join this mission.

6. Continue to center the needs and voices of the incarcerated learner as we seek to support their ability to realize the transformational power of education.

> There are countless barriers students must overcome to realize the transformational power of education, and we need to listen to and involve these learners deeply

[30] Kurtis Tanaka and Danielle Cooper, "Advancing Technological Equity for Incarcerated College Students: Examining the Opportunities and Risks," *Ithaka S+R,* May 7, 2020, https://doi.org/10.18665/sr.313202.
[31] Tanaka and Cooper, "Advancing Technological Equity for Incarcerated College Students: Examining the Opportunities and Risks."

The pandemic, Pell Restoration and the apparent shift in willingness to consider direct access to approved websites for incarcerated learners combine to create a dynamic environment in which to navigate these next steps. As we do, it will be vital always to continue to center the needs and voices of the students within the HEP programs. There are countless barriers students must overcome to realize the transformational power of education, and we need to listen to and involve these learners deeply as we seek to overcome one of these barriers: access to quality library resources for research.

The pace of change in this environment is daunting, and we are eager to respond to match that pace to get JSTOR in the hands of as many incarcerated learners as quickly as possible. In September 2021, we received a grant from the Mellon Foundation to scale access to JSTOR to all HEP programs in the United States.[32] This three-year effort will build on the work of both this project and the direct access pilot described above, supporting our work to expand this access while keeping the resource free for students to use and free for HEP programs and corrections offices to license. The funding has allowed us to hire a dedicated engineer to further develop our solutions and a manager to lead this effort. Both individuals now in these roles are themselves formerly incarcerated, and the manager leading this effort used the first offline JSTOR solution while a student at the Bard Prison Initiative. This offline pilot project has been just a single step on a journey towards our goal of providing JSTOR to all college students in prison. Reaching this goal will require more work, iteration, exploration and development of the kind seen on this project and described in this paper. We will continue to share the progress we make with the HEP community as we continue to expand access to academic resources to incarcerated learners, and we invite other providers and leaders in the HEP community to engage with this work to ensure that incarcerated learners gain access to empowering modes of education, skill-building, and self-discovery through research.

Appendix

Architecture

JSTOR Labs released the offline index software as open source under the MIT license in August 2021 and the code resides in the JSTOR Labs Github repository.[33] This software is broken up into two primary components:

1. *App:* The app folder contains a javascript website built on Vue.js that provides the primary user interface for the project. It allows students to search, browse, and request documents for approval which can then be provided to them. In addition to student access, it provides a password protected administration panel for administrators to view and manage requests and build a thumb drive containing a chosen subset of the content on the NUC (Next Unit of Computing) for use in situations where the NUC itself cannot

[32] Alex Humphreys, "Making JSTOR Available for all College Students in Prison," JSTOR Labs, October 8, 2021, http://labs.jstor.org/blog/making-jstor-available-for-all-college-students-in-prison/.
[33] "Code for JSTOR Labs Prison Education Project (PEP)," GitHub, Accessed May 13, 2022, https://github.com/JSTOR-Labs/pep.

be used. All of this functionality is powered by the API.

2. *API:* The API package contains the API which provides communication between the web interface, the Elasticsearch index, PDFs repository, and a requests database. It facilitates taking user search requests, properly formulating an Elasticsearch query, and returning those results to the web app. Additionally, it provides an interface to modify the requests database, build thumb drives based on a set of parameters from the web app, and retrieve documents if available. The API is written in Go to facilitate simple and easy cross-platform function, without the need of an extra interpreter or virtual machine on the target machine.

The App and the API are supported by the following additional packages:

- *Firmware Builder:* The firmware builder is a helper utility to customize and build a new *device image for a NUC.*

- *Startup tool:* The startup tool is a small program which is included in the operating system image to ensure a stable environment upon system bootup.

- *Elasticsearch:* Elasticsearch 7.x comes bundled on the NUC, and is included in the operating system built by the Firmware Builder. Additionally, a version for Windows is placed on the thumb drives produced by the API, and is accompanied by a Windows compatible copy of OpenJDK to facilitate running Elasticsearch. Elasticsearch is loaded with an index of JSTOR content for the purposes of providing search functionality.