

Improving Accessibility of Electronic Course Reserve PDFs to Users with Disabilities at Hunter College Library

Adina Mulliken, Daniel Vite, and Malin Abrahamsson

ABSTRACT

By April 2027 and 2028, institutions covered by Title II of the Americans with Disabilities Act are expected to be legally required to ensure that digital content created or used at the institution is accessible as defined by Web Content Accessibility Guidelines (WCAG) 2.1 Level AA. The new law strongly emphasizes accessibility of course materials—including PDFs. This case study demonstrates how an R2 academic library staff can enhance the accessibility of PDF course materials by improving the accessibility of electronic reserves (e-reserves) PDFs at Hunter College Library (HCL).

Processes described here can be adapted by other libraries. Supporting campuses' work to make course readings accessible may be a natural role for academic libraries. Locating or procuring the best quality version of a text available to the institution is a critical task for which libraries are optimally equipped. Furthermore, when readings are available only in print format, libraries can create higher-quality scans than those typically produced when the task is left to individual faculty members.

HCL began improving the accessibility of e-reserves PDFs in 2020. This article shares the knowledge acquired, established processes, limitations, and future directions. The workflow comprises checking each e-reserves reading. For those deemed poor, we locate an HCL collection or open access copy, purchase a digital copy, or remediate. Remediation involves optical character recognition (OCR), fixing errors therein, correcting reading order, removing repetitive headers and footers, and tagging. Literature the authors found on libraries proactively correcting OCR and tagging PDFs—that is, preceding a user's request—was sparse, with the exceptions of the University of Toronto and the University of Michigan. Literature about proactively doing so for e-reserves was even narrower. This case study is intended to help fill the gap.

INTRODUCTION

Since summer 2020, Hunter College Library (HCL) has made PDF files in its electronic course reserves (e-reserves) more accessible to users with disabilities through its course reserves remediation project. This article aims to share the knowledge we acquired and the processes we have established thus far, disclose limitations of the effort, and promote awareness of needs for further work in this area. Literature the authors found on libraries proactively correcting optical character recognition (OCR) and tagging PDFs—that is, preceding users' requests—was sparse, with the exceptions of the University of Toronto and the University of Michigan. Literature about proactively doing so for e-reserves was even narrower. This case study is intended to help fill the gap.

About the Authors

Adina Mulliken (am2621@hunter.cuny.edu; corresponding author) is Librarian and Associate Professor, Hunter College, City University of New York (CUNY). **Daniel Vite** (daniel444@gmail.com) is IT Support Assistant, Hunter College, CUNY. **Malin Abrahamsson** (mab0007@hunter.cuny.edu) is Acquisitions Manager, Hunter College, CUNY. © 2026.

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The process that HCL has established includes the following basic steps, tracked on a detailed spreadsheet: a brief evaluation of the quality of documents already present in electronic reserves; for documents deemed poor quality, an effort to locate a copy of the item in HCL's electronic collection or an open access copy, with a link provided to either; if no copy is located, an effort to purchase a copy if it is available through the library's e-book vendors; and, if none of the previous steps are successful, a decision regarding whether to remediate a poor-quality copy to improve its accessibility, to rescan a print copy in HCL's collection if available and then remediate it, or to request a copy via interlibrary loan (ILL) and potentially remediate it. (See the [HCL item tracking spreadsheet](#).)

Remediation of a PDF may be defined as changes to make the file more accessible to users with certain disabilities. Because PDFs can be images of text, they involve accessibility concerns that are not present in other formats like HTML. Accessible PDF files must have characters that are accurately recognizable by machines, for example, assistive technologies, so that the text can be read aloud correctly. Examples of such assistive technologies include screen readers, most often used by people who are blind or have low vision; text-to-speech software used by people with dyslexia and other learning disabilities or cognitive disabilities; and speech-to-text software used by people with physical disabilities. Born-digital documents are much less likely to have misrecognized characters than documents scanned from print sources. However, many readings are still not available to libraries in a born-digital format. OCR can make documents scanned from print machine readable, but it is not usually fully accurate and must be corrected. Our remediation process involves using ABBYY FineReader to conduct OCR and correct errors therein.

In addition, the document must be tagged. The ISO standard for tagging PDF files for accessibility is PDF/UA, which offers some tailored guidance, although the legal standard, Web Content Accessibility Guidelines (WCAG) 2.1 Level AA, must be met.¹ These specifications incorporate requirements for users with a wide variety of disabilities, including the types of assistive technology for users mentioned previously. The information technology (IT) support assistant initiated tagging documents after we began the project. An example of the need for tagging is to ensure a coherent reading order. If there is a callout box in the middle of the text, the reading order must convey to assistive technologies when to read the callout box and where to resume reading afterward. Tagging also makes features in the document, such as headings, identifiable, for example, to blind users using a screen reader to read the document aloud. The IT support assistant used ABBYY FineReader to check the reading order and further amended it in Adobe Acrobat Pro when needed.

Although publishers have initiated some efforts to move toward formats that are more easily made accessible, such as EPUB, libraries and vendors cannot quickly move away from our many PDF archives.² Previous studies have found that it is uncommon for journal article PDFs to be accessible, even from born-digital journals.³ A qualitative study reported that users emphasized concerns regarding the accessibility of full text.⁴ Anecdotally, blind students and disability office employees at several schools have told one of the authors that tagging PDF files is uncommon when users with disabilities request remediation, as it is too time consuming. For these reasons, as Hovious and Wang advocate, more remediation of PDF documents is important.⁵

Remediation before users request an accessible copy is key. The American with Disabilities Act (ADA) requirements that existed even before the planned 2027 changes to the law include "timely" and "equally effective" access for users with disabilities.⁶ Asking users to make a special request or wait a significant amount of time to have PDF files remediated for courses is

problematic under these requirements, and more so under newer planned regulations. Newer regulations from the US Department of Justice require digital content to meet standards at least as current as WCAG 2.1 Level AA and emphasize that course content be accessible when posted rather than after a user with a disability requests it.⁷ This applies to Title II institutions under ADA, which are comprised of government entities such as public schools, public libraries, public colleges and universities, and more. For institutions located in a state or local government with a population of 50,000 or more, the rule is expected to take effect in April 2027. For institutions located in a geographic area with a smaller population, the deadline is April 2028.⁸ Questions remain regarding how exceptions within the new regulations will come to be understood in libraries. However, the regulations as they were published in 2024 are clear regarding digital course content, which is most relevant to e-reserves and to this article. Furthermore, institutions receiving funding from the US Department of Health and Human Services are required to meet WCAG 2.1 Level AA beginning May 11, 2027.⁹ These rules have been in flux at the time of writing in April and May 2026. HCL's efforts demonstrate one way that a library of our size can meaningfully support its school in moving toward compliance with current requirements as well as anticipated regulations in letter and in spirit.

LITERATURE REVIEW

Library literature was searched in preparation for this publication. Only two articles were found that focused on the accessibility of library e-reserves, with one additional article briefly addressing the topic. Because the new law stresses accessible course materials—and e-reserves consist primarily of such materials—this focus is warranted. However, related scholarship on the accessibility of PDFs in other library settings, including an article on course packs, is closely related and is therefore included in this review.

In a 2017 article, Kahler details efforts at the University of Florida Library to improve e-reserve accessibility in collaboration with the disability office, when students request accessible materials.¹⁰ The library conducted OCR using Adobe Acrobat Pro, while the disability office handled tagging. Similar to HCL, the University of Florida purchased e-books whenever possible.

In a 2022 publication Roberson et al. briefly mention that the University of Georgia Library checks e-reserve materials for accessibility before posting them and allows students to request accommodations directly through the library.¹¹ They indicate that the library may link to full-text or scanned materials. However, they do not detail whether the library conducts OCR, corrects OCR, or performs tagging.

In 2021 Lee described accessibility efforts at Georgia State University, where print document delivery materials were scanned and OCR was conducted using Adobe Acrobat Pro.¹² The library used Adobe Acrobat Pro because, similar to HCL, the school provided it for free. Manual OCR correction for a sample of 20 readings took between 10 minutes and three hours per document. While Acrobat yielded usable initial results, the library planned to evaluate alternative OCR tools.

In 2024 McGraw outlined e-reserves improvements at the University of Winnipeg Library.¹³ She notes that all its PDFs are edited for basic accessibility, which she describes as using 600 dpi resolution for scans from print, and

extra care taken to reduce shadows by pressing the book down firmly and ensuring the pages are scanned as straight as possible.... Staff are also required to check all materials before scanning for extraneous marks; anything in pencil needs to be erased before

scanning, whereas heavily marked items that cannot be adequately cleaned up are flagged for replacement and an alternate source is sought. Scans are also made one page at a time, as screen readers are unable to parse double page scans and Adobe Acrobat Pro DC, the editing program used by course reserves staff, is unfortunately very inefficient at splitting double page scans. The amount of editing time that is saved more than compensates for the extra time spent creating a high quality scan, and for this reason we strongly encourage faculty and instructors to let us create scans for them, rather than submitting their own scans that may not meet our usual standards. Once the excerpt is scanned, staff use Adobe to crop extraneous margins, deskew off-kilter text, apply OCR, and edit any OCR errors.¹⁴

She acknowledges that the library was not staffed to implement the important step of tagging PDFs, but that the high-quality scans are easier for the school's Accessibility Services to work with. She notes at the time of writing that the library had "recently replaced Adobe Acrobat Pro DC with ABBYY FineReader PDF 15." These steps related to improving scans and OCR are very similar to HCL's steps, except that HCL does not routinely do this when scans are originally submitted.

At the University of Toronto in 2018, Kwak and Newman described a more extensive endeavor creating accessible course packs, using ABBYY FineReader to conduct and correct OCR and Adobe Acrobat Pro for tagging.¹⁵ Like HCL, they searched for accessible full-text versions and purchased digital and print materials as needed. The reported average time for the OCR process alone was 12 minutes, but full remediation with ABBYY FineReader took significantly longer—comparable to HCL's untracked rough estimate of 15 minutes to two hours per document, with difficult documents taking several days.¹⁶

In a 2018 paper Schroeder described an on-demand remediation service launched at the Michigan State University Library in 2016 to improve accessibility of digital materials for users with disabilities.¹⁷ Print remediation was under consideration but not yet included. The library used ABBYY FineReader for OCR, correcting OCR errors, and fixing reading order, with Word or Adobe Acrobat used for additional tasks. Four users had submitted requests, most of which were fulfilled within one business day.

Brunskill et al. (2021) examined the disability service pages of all 127 Association of Research Libraries members and found that

with respect to alternate format conversion, no language was found for 46 pages indicating that any such service was available. Additionally, it was sometimes unclear whether the service described on the webpage was distinct from typical document delivery or interlibrary loan services available to all users, and some simply mentioned that help with scanning materials could be provided, while others provided detailed guidance on how to request alternate formats.¹⁸

Alternate format conversion typically includes improving the accessibility of PDF files. Thus, most libraries may offer some type of PDF remediation. However, whether this includes OCR correction or tagging is unknown.

Brunskill's study identifies two schools' websites with detailed alternate format information: the University of Guelph (U of G) and the University of Michigan (U-M). U of G's website offers to convert documents to multiple formats upon request. The website does not indicate whether the U of G offers tagging. The website states that alternate formats created using OCR "will only be

proof-read prior to delivery if requested, and if your request meets the following criteria: the resource is required for your academic research [and] you have a visual impairment.”¹⁹

As of August 2023, the U-M Library’s site stated that the library could add structural tags, image descriptions, and convert materials to alternative formats such as EPUB, Braille, Word, or MP3.²⁰ That page or a similar one is no longer publicly available. Both the U of G and the U-M library websites offer to convert a wide variety of library and personal reading materials.²¹

As of May 2025, the U-M’s remediation services included OCR correction using ABBYY FineReader, tagging with Adobe Acrobat Pro, and format conversion, including EPUB. One accessibility services librarian, a graduate student project manager, and three to five part-time student workers remediate PDFs and other materials as requested by users, as well as—proactively—library collections and digital content. The librarian, Birchmeier, reports that he tests new applications, including artificial intelligence (AI) tools, for remediation, and finds as of May 2025 they either are missing necessary features or, for AI, are cost-prohibitive.²²

Besides published literature, one of the authors has corresponded with librarians at several academic libraries who have worked on PDF accessibility across contexts, such as e-reserves and ILL. While routine OCR is common, more intensive work like OCR correction and tagging appears less so. This is likely because running OCR is fast and simple to do, but correcting it is time consuming and tagging is complex. A model used by some of these libraries involves performing OCR correction and tagging only upon request from a user with a disability. Compared to relying solely on campus disability services, this library-based model may extend access to users not registered or eligible for such services and offer greater convenience. At present, the only libraries known by the authors to proactively correct OCR or add tags prior to user requests are the University of Michigan, University of Toronto, Georgia State University, University of Winnipeg, and Hunter College Library. Further research on this subject is needed. HCL is unique because it is an R2 US library with a multi-year sustained effort focused on e-reserves.

LOCAL CONTEXT: E-RESERVES AND ACCESSIBILITY PRACTICES

HCL is a public institution serving 22,879 students in 2024, comprising primarily undergraduates as well as graduate degrees in nursing, education, social work, social sciences, and fine arts. It is part of the City University of New York (CUNY). The HCL has approximately 41 employees, four of whom are part-time adjuncts. Areas of the library involved in e-reserve accessibility work include the Silberman School of Social Work and Urban Public Health (SWPHL), a branch library, with participation of one librarian, one IT support assistant, and several college assistants (CAs; a part-time position at HCL, usually occupied by students or recent graduates, but more advanced than College Work Study positions). Additional support is provided by Reserves, Systems/IT, the acquisitions manager, and the ILL manager. The previous acting dean, the deputy chief librarian, and the head of the SWPHL have supported this project by allocating staff time and resources.

At HCL, e-reserves traditionally had no guidelines regarding accessibility. Beginning in 2020, e-reserves accessibility guidelines were posted but have not been widely enforced. Hunter College (HC) does not require digital accessibility training for its faculty or staff. Many chapters scanned from print books with skewed or wrinkled pages, handwriting and underlining on the page, and unclear text have been included in HCL e-reserves, which might not have been included if HC had stronger accessibility policies.

Even at schools that do not permit inaccessible or poorly digitized materials for course reserves, a significant amount of content, particularly book chapters, is not available to libraries in any accessible or even born-digital format. Offices serving students with disabilities may be able to obtain some of these documents in electronic format from publishers under policies such as Section 715 of Chapter 219 of the New York State Education Law.²³ Additionally, users and disability offices may locate the book in electronic format through services such as Bookshare, Learning Ally, Internet Archive, and, for its member libraries only, HathiTrust. However, this law and these services require that the user be identified as a person with a disability, and the electronic copy cannot be shared with others; consequently, it cannot be used for course reserves for the full class. Furthermore, users with disabilities have to take additional burdensome steps, such as registering with their school's disability office, facilitating communication between professors and disability office employees, potentially searching these services' holdings themselves, and waiting for the alternative format. Sometimes these alternative formats need additional remediation. Moreover, not all students with disabilities are willing or able to document their disabilities to qualify for such services, and not all users with disabilities are students. Faculty, teaching assistants, librarians, and others are excluded from using the student disability office or comparable services at many schools. For these reasons, services for use exclusively by people with disabilities do not always provide an equivalent experience to a course reading that is immediately available to users without disabilities.

As these readings need to be scanned from print, even schools with stronger accessibility practices than HC need to remediate them for course e-reserves and learning management systems.

PRELIMINARY EFFORTS

An early discussion with the HC Office of AccessABILITY included an offer to share documents that the Office had already remediated with HCL to post in e-reserves, if doing so would meet copyright requirements, which we understood would be the case for readings that we could already post according to copyright laws. However, gathering and organizing these documents appeared to be difficult tasks and were not completed.

HCL employees requested that the Office of AccessABILITY identify courses in which students with disabilities were enrolled to allow HCL to focus on remediating those courses. However, the Office of AccessABILITY did not know which courses would have students with disabilities enrolled until the semester in which they were enrolled, whereas HCL wished to remediate courses ahead of the semester. Some HCL employees also requested that the Office of AccessABILITY maintain a separate file of remediated e-reserves documents to be used by students with disabilities. This would ensure that HCL would not have the responsibility of tracking which documents were remediated, nor would they be concerned about potential differences in accessibility needs between students. However, others at HCL believed that this separate organizational task for accessible materials was impractical. E-reserves include thousands of documents for hundreds of courses, which may change at any time; therefore, keeping track of separate, accessible copies would involve substantial ongoing work. HCL agreed on a more integrated approach of posting accessible documents in e-reserves, even if this meant that HCL would take longer to complete the work. HCL would strive to meet accessibility standards, while the Office of AccessABILITY would make further adjustments to meet students' unique needs.

In the summer of 2020, the following accessibility guidelines were agreed upon and posted on HCL's Electronic Reserves Guidelines for Faculty webpage. We wanted the guidelines to be as easy as possible for faculty members.

Accessibility to People with Disabilities

To make items equally accessible to students with disabilities and to comply with accessibility law, the following steps are needed:

Clean Condition

Items should be clean copies without marks such as handwriting, highlighting, or discoloration from copying and scanning. If you do not have a clean copy, try requesting one via [interlibrary loan](#) [hyperlink].

Optical Character Recognition (OCR) for PDFs

PDFs should be OCR'd. If you submit your materials to the Library through [Reserve Request](#) [hyperlink], the Library will handle OCR as soon as possible. If you upload your own material directly to e-reserves, you are responsible for OCR. If you can copy and paste an individual phrase or sentence from the PDF, it is usually OCR'd.

PDFs Converted from Word or PowerPoint

Documents converted to PDF from other formats, such as Word or PowerPoint, can be very difficult to make accessible. If at all possible, upload the original format, or at least save the original and make it available if needed.

Questions About How People with Disabilities Use the Web

If you are interested to understand [how accessibility is important for people with various disabilities to use web content, WebAIM](#) [hyperlink] is a good source of information

HC's Office of AccessABILITY routinely sends an email to faculty members with students registered for accommodations enrolled in one of their courses. HCL's guidelines have been included in the email. An email sent by HCL to the faculty before the start of each semester also includes the accessibility guidelines.

Regular e-reserves staff have, on occasion, encouraged or helped faculty members to locate clearer copies of documents when they submit them. However, additional efforts to educate faculty members would be ideal.

HCL's online Course Reserves guide was revised by an HCL committee in 2025, and the accessibility guidance was expanded. It now includes a section encouraging faculty to find adequate citations to readings or to work with a librarian to obtain these in advance of when they want the materials available. This facilitates searching for more accessible copies. The guide advises faculty to use born-digital content when possible, rather than scanning from print. It indicates a preference for HTML, or, if PDF is necessary, to use EBSCO, if available, because of its remediation option. Brief guidance on permanent links is included. The accessibility guidance recommends using a clean scan when scanning is unavoidable.

Additionally, we created an agreement that faculty are asked to sign when they submit reserves materials. It says,

Digital Accessibility for E-Reserves Agreement

E-reserves must follow [CUNY's IT Accessibility Statement](#) [link] and applicable New York state and federal laws and regulations. Hunter College Libraries collaborate with teaching professors to work toward meeting these standards. For PDFs, please follow [E-reserves Accessibility and Formatting Guidelines for Faculty](#) [link].

Please do not submit readings scanned from print if digital copies are available as described in the [guidelines](#) [link]. Scanned readings are not accessible without remediation. Remediation is difficult. If you need assistance searching for digital copies, please [Ask a Librarian](#) [link] in advance to collaborate with them to complete your search.

I have read the Digital Accessibility for E-reserves Agreement and will collaborate with the Libraries to make E-reserves for my course(s) meet applicable accessibility standards.

Instructor Name *

CHOOSING OCR SOFTWARE

CUNY provides free access to Adobe Acrobat Pro, and it is recommended by an expert on campus. The librarian performed some cursory corrections of several documents using Acrobat Pro and did not find significant errors. Therefore, we started using Acrobat Pro at the end of 2020.

The librarian provided brief training on conducting OCR and correcting errors identified by Acrobat Pro. However, e-reserve staff quickly found documents with many errors that needed to be corrected, including nearly entire documents. As this correction would be excessively time consuming, we suspended the project.

We were then consistently advised by experts from our university level and responses on the Association of Colleges and Research Libraries' Universal Accessibility Interest Group listserv that ABBYY FineReader was considered the best software to produce higher-quality OCR. The acting dean of HCL approved this purchase in the spring of 2021, and the subsequent acting dean supported it. After navigating CUNY's lengthy purchasing process, the software became available in December 2022. The librarian and IT support assistant began working with it. The IT support assistant taught himself to use it and has since done all the work of remediating documents with ABBYY.

CHECKING READINGS AND LOCATING ALTERNATIVES

Concurrently with the work to obtain the OCR software, in the summer of 2021, the librarian assessed readings in several courses for the following:

- Whether they appeared visually clean or had marks/discoloration on pages from scanning, marks from the binding, skewed pages, handwriting, highlighting, or other blemishes;
- Whether they allowed text to be selected, which was used to determine if they underwent OCR;
- Whether they appeared to be born digital or scanned from print. While this could sometimes be established by obvious signs, such as the appearance of the book's spine or page edges, this was not always possible to determine.

If any of the previous items were not favorable for accessibility, the librarian attempted to identify the citation to the item. This sometimes included searching Google and emailing the professor who submitted the reading for a citation.

Subsequently, the librarian searched HCL's digital collections and linked to the full text, if available. Occasionally, she located an open access version of the item and linked to it.

Contacting professors to clarify citations and track their responses can be time consuming; therefore, this was done as a last resort. However, these connections allowed a chance to increase awareness of the work the library was undertaking. Many professors expressed support and offered to assist. The amount of work that some were willing to perform was notable.

The librarian created a spreadsheet to track progress and refined it to clarify and routinize the process for training purposes. The current version of the spreadsheet template is presented in the [HCL Item Tracking Spreadsheet](#). In the summer of 2021, she began working on the project with two CAs, including the author of this article. She also created training documentation.

Approximately six courses for the summer of 2021 were checked for links to the HCL collection. In fall 2021, approximately 12 courses were checked, and links were added to e-reserves. The number of readings per course varied widely, from one to more than 100. More than 600 items were examined. Table 1 lists the approximate number of courses examined per semester. Starting in the summer of 2022, an increasing number of readings that we encountered had already been checked; therefore, this work began to decrease. Starting that summer, we checked all courses for links by the end of the semester. Although doing so before students encounter the material would be ideal, faculty may add inaccessible content at any time; thus, this goal is not entirely attainable under current policies. However, by the spring of 2023, an approximately equal number of readings had been checked previously as there were new readings, and we checked them all before the end of the semester. By the end of the summer of 2023, the IT support assistant checked and remediated almost all readings submitted before the fall semester began.

In the fall of 2022, the largest number of courses was checked. The head of the Social Work Library approved training for all CAs in that branch library to work on the project. These CAs covered the circulation desk; thus, they worked between interruptions; however, on some days and times, the desk was quiet. Six CAs were trained to complete the spreadsheet for each reading, which significantly improved our progress. The training document included an explanation of the citations, locating permanent proxy links in some of HCL's vendors, and more. They completed the complex work of searching for citations to sometimes very obscure readings. The librarian spot-checked the work and copied those links from the spreadsheet to e-reserves.

Table 1. Number of newly checked courses per semester.

Semester	Number of Courses Newly Checked for Accessibility and Links to Full Text in HCL's Collection
Summer 2021	6
Fall 2021	12
Spring 2022	None, due to staffing
Summer 2022	4; from this semester forward, all readings were checked by the end of the semester, except fall 2024 and spring 2025
Fall 2022	46
Spring 2023	21; from this semester, all readings were checked <i>before</i> the end of the semester, except fall 2024 and spring 2025

Semester	Number of Courses Newly Checked for Accessibility and Links to Full Text in HCL's Collection
Summer 2023	2
Fall 2023	9
Spring 2024	10
Summer 2024	All courses had been checked previously
Fall 2024	None, due to staffing
Spring 2025	None, due to staffing
Summer 2025	1
Fall 2025	19
Spring 2026	5

E-BOOKS

As in other academic libraries, some of the e-books that HCL purchases are individually selected, and HCL expects to have permanent access to them, while access to other e-books can be terminated by vendors. We link to all e-book chapters located in the collection, whether or not they are permanent, and attempt to check the links from e-reserves if the same item is requested in the following semester.

The librarian was unable to determine whether licenses allowed e-book chapters to be uploaded to e-reserves. Licensing is complicated at HCL, as most e-book licenses are managed by the Central Office of Library Services (OLS) at CUNY, with some managed by New York State. There has been staff turnover in OLS, and obtaining answers to these questions has not been simple. If chapters available only in PDF format on the vendor's sites can be uploaded to an e-reserve instead of being linked, users would have fewer web pages to navigate to obtain access to readings. This would improve usability and accessibility, as users would not have to learn to navigate a wide variety of complex vendor web pages. Furthermore, vendor websites commonly have accessibility problems.²⁴ If chapters are available in formats other than PDF on vendor websites, the potentially improved accessibility of these formats could be weighed against the disadvantages of requiring users to navigate to the vendor site.

Funding to purchase e-books was available at some points during the project. Purchasing an electronic copy of a book that contains a chapter in e-reserves seemed to be more effective than attempting to remediate a chapter. Whenever possible, the librarian requested e-book acquisition. As with most libraries, HCL does not purchase individual journal articles; therefore, the attempt to purchase electronic copies was made only for e-books available through the library's vendors. Later, the acting dean of HCL explicitly endorsed the acquisition of e-books to improve accessibility. HCL has a reserves fund that is typically used if faculty contact HCL to request adding a new book or e-book required for their class. The acting dean endorsed that this fund also be used when it is determined that an e-book would most efficiently improve e-reserves accessibility. The librarian and acquisitions manager then increased e-book purchasing efforts.

With the exception of excessively expensive titles, the librarian and acquisitions manager collaborate to procure e-books with multiple-user licenses, an approach that mirrors the University of Florida's strategy, which likewise prioritizes securing licenses that support more than one user. According to the acquisitions manager, HCL generally prefers digital rights management (DRM)-free content when it is available at a reasonable price. DRM-free options are

limited. EBSCO—the primary e-book vendor used by HCL—has large collections overall but does not consistently provide DRM-free titles.

The preference for DRM-free content provides numerous advantages not only for course reserves but also for all library users. DRM-free content refers to digital media that is not restricted by DRM technology, allowing users greater flexibility to download, copy, share, transfer, and use materials across devices and applications without the need for specialized software or equipment. These materials are typically distributed in standard formats such as EPUB, PDF, or MP3. This stands in contrast to DRM-protected content, which relies on technological controls such as encryption to limit use to specific platforms or to restrict functions like printing and sharing. As a result, DRM-free e-books offer clear advantages in terms of accessibility and user experience.

DRM commonly interferes with access by assistive technologies used by people with disabilities and can entirely lock them out of content. For example, ProQuest's Ebook Central relies on Adobe Digital Editions (ADE), which uses DRM, for the downloadable versions of its e-books. Until April 2026, EBSCO also used ADE. EBSCO reported, "Unfortunately, DRM may conflict with some of these tools [Kurzweil, Read and Write Gold, Natural Reader, ClaroRead, or any clipboard reader tools, commonly used by dyslexic readers]. If a tool relies specifically on what may be copied to a clipboard, it's [sic] functionality is limited to the publisher's copy/paste allowance for the title." On a positive note, EBSCO rolled out a new DRM solution, Radium LCP, to take the place of ADE and to work with more assistive technologies.²⁵ A review of ProQuest's online information did not reveal any indication of plans to make its DRM more accessible to assistive technologies. Both vendors provide workarounds for users with disabilities, including requesting an alternate, DRM-free version for use exclusively by the user with the disability.²⁶ EBSCO offers to provide this within three to five business days, and a time frame was not found for ProQuest.²⁷ With both vendors, for many of their e-books, any user can download a limited amount of the book without DRM. This is the same amount that many users are familiar with downloading for purposes of printing, often a chapter or 60 pages. While these options do not always seem to meet the spirit of requirements for "equally effective" and "timely" access, these options are likely to be an improvement over the accessibility of chapters scanned from print with uncorrected OCR.²⁸ Since we are not staffed to remediate all submissions, the e-books represent a step up from scanned-from-print PDFs.

When HCL was faced with requests for titles available exclusively for single-user licenses, multiple copies of reasonably priced e-books were acquired to provide more access to students. In cases where licenses for one or three users proved to be prohibitively expensive for purchasing multiple copies, e-books hosted on ProQuest's Ebook Central platform were consistently favored. The decision was influenced by the platform's flexibility and ease with which the acquisitions manager could log in and make specific adjustments to individual titles by restricting access to online-only. This access mode prevents patrons from checking out e-books with single- or three-user licenses for an extended period. Instead, the title is accessible solely in the web browser and is automatically freed after the user closes the browser. Although a brief lag occurs before the e-book becomes available to the next patron, this approach has helped address the challenge of limited user licenses while improving the availability of the required readings.

On February 18, 2025, Clarivate, which owns ProQuest, announced its plans to phase out one-time perpetual purchases of e-books in favor of subscription-based access. It remains unclear how this transition will impact accessibility.

DECISION TO REMEDIATE, SCAN AND REMEDIATE, OR USE ILL

If none of the previous steps are successful, the IT support assistant decides whether to remediate a poor-quality copy in e-reserve to improve its accessibility, rescan a print copy in HCL's collection if available and then remediate it, or request a copy via ILL and potentially remediate it.

HCL has a longstanding policy that materials obtained via ILL cannot be used for e-reserves due to copyright restrictions. However, in some situations, the best option to obtain a clearer original is to use ILL. HC's copyright assistant asked a member of the university's legal counsel about the potential conflict between copyright and accessibility requirements. We learned that as long as we had an original copy that could legitimately be used for e-reserve based on the copyright, the concern about meeting accessibility requirements outweighed the concern about copyright for using materials requested through ILL.

Therefore, we added a step to our process of ordering readings via ILL. The library employee who initially checks each reading answers several questions on the spreadsheet. If they indicate that the reading has skews or marks that cover the text of the reading (that could not be cropped off), and HCL did not otherwise have access to a better copy, then the librarian marked the reading as requiring ILL.

The following standardized message was included on the ILL request form shared with the loaning library: "We are looking for a copy for accessibility for students with disabilities. A copy that is born-digital would be best if possible. If a print document is scanned, as few markings and skews on the page as possible would be helpful. Thank you! Internal note: [COURSE NUMBER]."

The librarian ordered many of these items; however, keeping up with the backlog was challenging. The librarian created a training document for CAs to assist in ordering materials via ILL. A shared ILL account was created for this purpose.

The librarian began training two CAs in the spring of 2022. However, during the first few efforts, finding sufficient correct citation information for these items was sometimes challenging, and ILL items were often unfulfilled due to incorrect citations. Another challenge was to coordinate the CAs' work schedules with the items received via ILL, ensuring that readings were tracked and downloaded in a timely manner. With additional practice, these obstacles might be overcome.

However, as the IT support assistant's ability to remediate PDF files has increased, he often prefers to remediate rather than wait for materials to be received via ILL. The versions received via ILL were sometimes clear copies that could be used without change. However, despite the note in the request form, they sometimes needed to be remediated or were even worse than the original at HCL. Therefore, choosing whether using ILL or remediating would be more efficient could be difficult, and we have followed the IT support assistant's preference to remediate.

Scanning

If the original scan is not sufficiently clear, the IT support assistant frequently locates a printed copy of the book to rescan. Scanning is performed by the IT support assistant, with occasional help from CAs. Pages are scanned one at a time, rather than two-page spreads of a book, to avoid having to split the scans using ABBYY. We use our public scanner, which is a SCANNX BookScanner 7145. Although the older software did not allow us to determine the dots per inch (dpi), a recent upgrade shows this information. The IT support assistant currently scans at 300 dpi, as higher resolutions significantly slow the scanning process, but he may test higher settings for documents requiring extensive text correction.

Early in the project, we briefly explored acquiring a different scanner. Features to facilitate or automate page-turning could have been helpful, but pursuing funding for new equipment did not become a priority. Aside from page-turning features, we did not identify scanner-technology limitations.

REMEDIATION WITH ABBY FINEREADER AND ADOBE ACROBAT PRO

Our remediation process consists of the following primary steps on every project.

- Visual optimization
 - Clean up: removing markings on the edges of the document or on the text
 - Deskewing if necessary (rotating to correct tilt or misalignment of the original document)
 - Line straightening
 - Visual re-check/final clean up
- Page analysis (with occasional table structure correction)
- Reading order correction
- Text recognition
- Text verification
- Tagging

The IT support assistant performs additional steps, such as making tables more accessible and correcting hyperlinks, on a case-by-case basis, as described later.

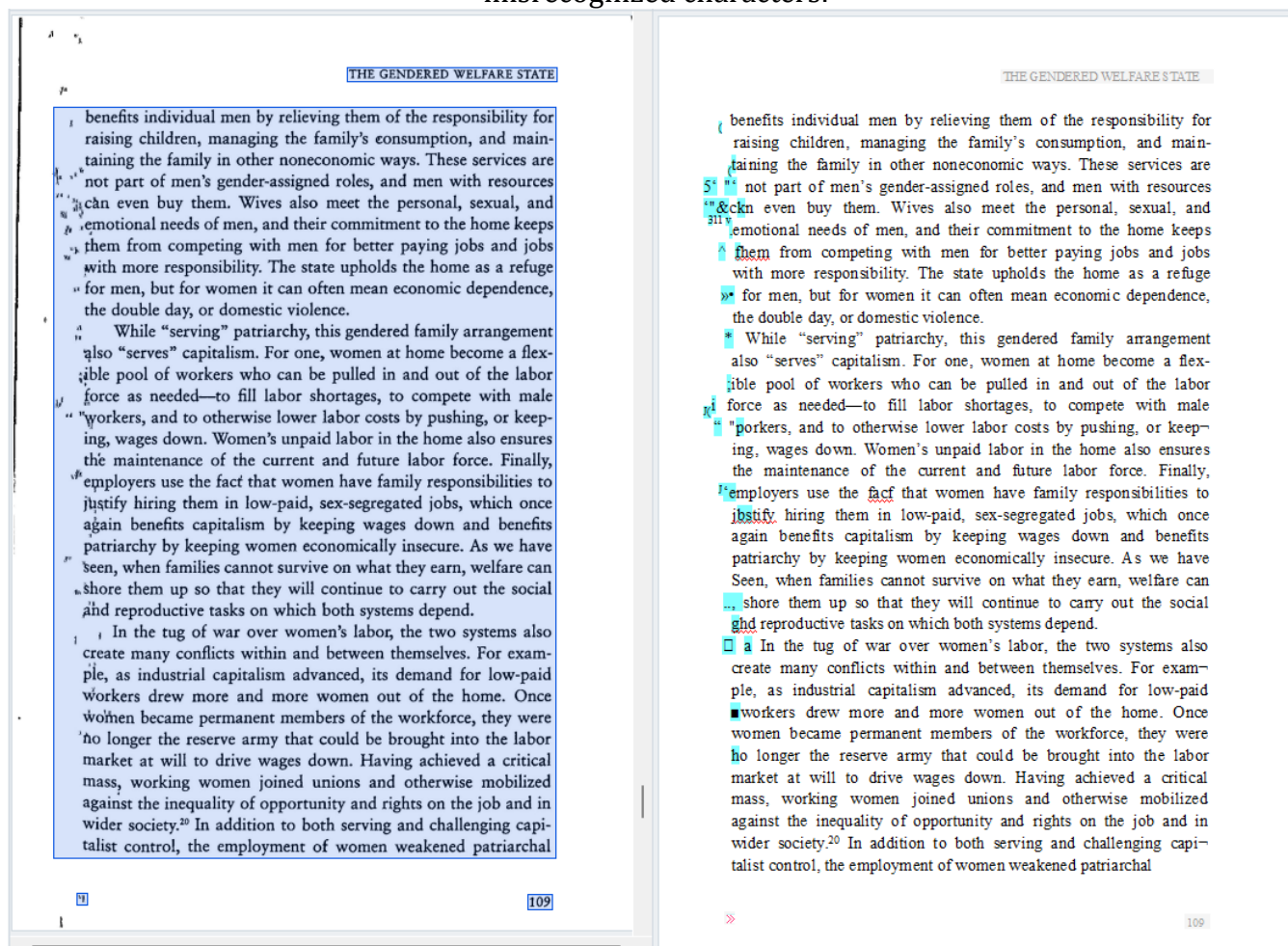
Visual Optimization

Visual optimization includes clean-up/erasure, document deskewing, line straightening, and final clean-up/check. These steps are conducted on the Image Editor page of the OCR editor. These steps are taken because everyone benefits from a clean document, and the clearest “image” allows the OCR editor to recognize text as accurately as possible.

Clean-up

This step consists of removing markings anywhere on the documents. This is important because once a page is analyzed, markings can be “recognized” as text, which disrupts the document structure. For instance, if a marking is present on or just underneath a line of text, characters may be misrecognized, and lines of “text” may appear where they are not supposed to. Figure 1 is an example of how markings on a page affect the analyzed text of a page. The markings on the page seen on the left have resulted in the border of the text being disrupted in the image on the right. Marks are being “recognized” as all kinds of nonsensical text, and marked text is being misrecognized as different and misspelled words like *facf* (fact), *jbstify* (justify), and *porkers* (workers).

Figure 1. Marked-up document page (left) and its ABBYY-scanned counterpart (right) with misrecognized characters.



Deskewing/Line Straightening

Deskewing and line straightening are performed back-to-back after the initial clean-up because they often make a “mess” themselves. When deskewing a page or straightening the text lines, the borders of the “image” are shifted and warped, and new dark borders may be created to fill in the gaps.

Visual Recheck/Final Clean Up

The IT support assistant checks the document again in the image editor to erase the borders that emerge after deskewing and line straightening. If the initial clean-up is not performed, and many markings are present on the page, these markings may be used by ABBYY as a frame of reference for the deskewing and line-straightening process. The IT support assistant found that performing the initial cleanup first and then following up with these processes yielded better results. The final clean-up allows him to erase anything he may have missed the first time, as well as borders that may have popped up during other processes.

Page Analysis

After exiting the Image Editor, he selects the option to “Analyze All Pages.” ABBYY then locates any relevant text, images, or tables in the document and creates boxes for each item. ABBYY creates a left-to-right and up-to-down reading order for the boxes on each page. This is occasionally a

problem for documents with a different reading order, such as callout boxes or other interruptions to the text.

The IT support assistant also manually corrects the table structure after it has been analyzed to accurately convey the data. Many types of tables exist, and not all of them make the divisions between data points clear. This manual correction on ABBYY makes it easier to tag the PDF later.

Reading Order Correction

To correct the reading order, the IT support assistant first removes any unwanted text boxes that compromise the logical reading order. These commonly include repetitive headers, footers, page numbers, and more. For text-to-speech users, headers and footers are read aloud, interrupting the text each time users move from one page to the next, so the IT support assistant removes them from the layer of text read by a screen reader.

Next, to verify that the reading order is correct, he clicks on the reading order option and ensures that the numbers assigned to the boxes are in the necessary reading order. Subsequently, if the reading order of the remaining content boxes is incorrect, he selects the “reading order” option and then clicks on the boxes in the order in which they are to be read on that page (see Figure 2).

Text Recognition

Text recognition is a process in which the analyzed pages and their respective boxes are scanned using ABBYY. All relevant texts, images, and tables are recognized. If a document contains more than one language, the approved languages must be set prior to text recognition.

On the OCR editor page, the window is split into two smaller windows. On the left side is the view of the document as it appears visually, along with the analyzed boxes that were created. From this window, the appearance of documents cannot be altered. The sizes of the recognized boxes and reading order can be altered, but this does not affect the physical appearance of the page. The right-hand window is a bare version of the document, as recognized by ABBYY. On this side, any residual markings, colors, or features that are visible on the page are not present. Only the text, images, and tables recognized by ABBYY exist here. They are located in approximately the same area as the boxes recognized from the left-side window. In Figure 2, which shows a completed project, you can see that the reading order of the highlighted text/table boxes has been determined on the left-hand window; the number being on the top left corner of each respective highlighted box. Additionally, the page number and footer of the document, seen on the left side of the image, are not visible as text on the right side of the image because, as previously mentioned, the IT support assistant removes these.

Figure 2. Document page with reading order boxes (left) and its ABBYY counterpart (right) with proper OCR and table structure.

Table 1: Demographic and Workplace Characteristics (N = 2,326)

Characteristic	n (%)
Gender	
Female	1,787 (81.9)
Male	378 (17.3)
Transgender	6 (0.3)
Other	12 (0.5)
Race	
White	1,181 (54.5)
People of color	986 (45.5)
Education	
≤ Bachelors	498 (22.9)
≥ Masters	1,680 (87.1)
MSW	1,303 (56.0)
Current position	
Frontline workers	1,363 (58.6)
Program directors and managers	963 (44.4)
Union member	
Yes	676 (31.1)
No	1,497 (68.9)
Years in human services	
0-9	755 (33.1)
10-19	658 (28.9)
20+	865 (38.0)
Program focus*	
Mental health	467 (20.1)
Health care	270 (11.6)
Housing/homeless	199 (8.6)
Child welfare	192 (8.3)
Education	164 (7.1)
Older adults	158 (6.8)
Family services	146 (6.3)
Youth services	134 (5.8)
Substance abuse	118 (5.1)
Public and food assistance	95 (4.1)
Sector	
Public	584 (25.1)
Private nonprofit	1,619 (69.7)
Private for-profit	111 (4.8)

Note: Each category may not total 2,326.
* N = 54 shown; N = 54 includes domestic violence, criminal justice, child care, military, employment/training, disability, immigrant services, legal, advocacy.

The issues included "too much time on documentation," that "measures used did not capture what staff think is important," and that "too much time is spent on tracking and reporting." Around two-thirds found "the emphasis on program results or outcomes" and "reliance on quantifiable performance measures" to be problematic.

4 The efficiency cluster included six items related cost savings. Over 77 percent of respondents reported their program as inadequately funded; 76 percent indicated that they had to increase the number of people seen; 75.7 percent said they lacked the capacity to meet the needs of people served; and 70.3 percent stated that the focus on "bottom line" undercuts quality. Nearly 60 percent considered the practice of replacing of higher-paid with lower-paid staff to do the same work as problematic.

The standardization cluster included 11 items related to the impact of managerialism on relationship building, often considered to be the foundation of social work practice and a predictor of positive client outcomes (Norcross & Wampold, 2011). Yet 68.2 percent found the increased routinization of practice problematic; 68.2 percent said that managerial context did not leave them with enough time to serve people in need, to assess needs (56.8 percent), or to build trust (54 percent). Some 50 percent reported that the computer came between workers and clients. Others noted that clients have to meet too many program requirements (55.7 percent), and 55.6 percent were upset by the use of preset screening tools.

Commitment to Managerialism: Logic of Social Work and Logic of the Market
To deepen the understanding of the link between an agency's overall commitment to managerialism and the experience of agency workers, we constructed a score that measured the worker's perception of their agency's "commitment to managerialism" as high, medium, or low. Based on the earlier-noted 30 indicators of managerialism, the score ranged from 30 to 90. Low managerialism settings had a score ≤ 49; medium a score of 50-64, and high ≥ 65. We then analyzed commitment to managerialism in relation to two overarching concepts: the logic of social work (the fundamental social work principles and values) and the logic of the market (basic business principles and values). This comparison revealed a troubling trend. Workers employed in agencies with a high commitment to managerialism score were more likely than workers employed in agencies with a low commitment to managerialism score to report service and practice issues as problematic.

Logic of Social Work
The logic of social work refers to features of service provision and professional practice that align with

Table 1: Demographic and Workplace Characteristics (N = 2,326)

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The issues included "too much time on documentation," that "measures used did not capture what staff think is important," and that "too much time is spent on tracking and reporting." Around two-thirds found "the emphasis on program results or outcomes" and "reliance on quantifiable performance measures" to be problematic.

Downloaded from https://academic.oup.com/swpr/advance-article-abstract/doi/10.1093/swpr/ckab001 by Hunter College Library user on 15 August 2023

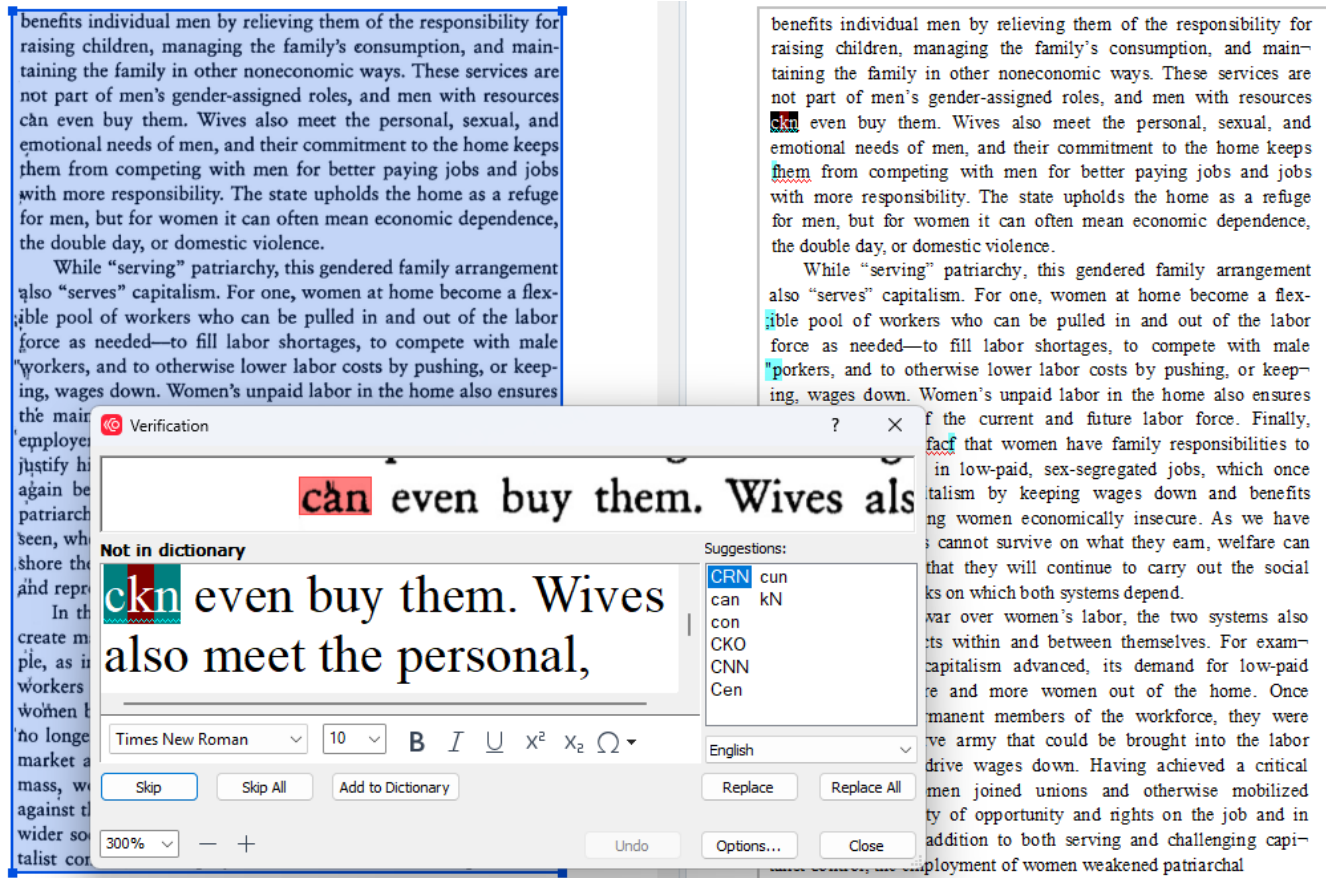
The right-side window can be considered a script of the view of the left-side window. This is the script available to assistive technologies and is what they will work off. For that reason, it is important that the text seen on the right-side window accurately reflects what is seen on the left-side window. That is where "text verification" comes in.

Text Verification

Text verification is performed using the right-side window and involves verifying whether the text in the right-side window accurately reflects the text as it appears in the left-side window. This is initiated by the "Verify" button on the ABBYY Toolbar. Depending on the resolution of the scan and the language of the text, this can be either quick or tedious. When ABBYY cannot tell whether a character was incorrectly recognized or misspelled in the original document, text verification prompts the user to verify whether the "low-confidence characters" accurately reflect the text and amend those that do not. For lower-resolution scans, the number of low-confidence characters that require verification increases exponentially. In addition, depending on the quality of the scan and the document's font, ABBYY may misread the text, and the resulting word will be spelled incorrectly on the right-side window without being marked as a low-confidence character. Examples are the letter "l" being misrepresented as a "1," the "&" symbol being read as "8c," and the word "lantern" being read as "lantem." Skimming the document to find mistakes and using the "Find" feature to seek recurrences is helpful. To reuse the example from Figure 1, Figure 3 shows the text that was analyzed and recognized by ABBYY from a lower-quality scan with markings in the text. The low-confidence characters that are meant to be reviewed for the text verification

process are highlighted in blue, have a red underline, or both. Once verification has been initiated, a verification box appears showing the highlighted low-confidence character as it appears in the original text, and the text can then be corrected for the script that assistive technologies will later use.

Figure 3. An example of text verification in ABBYY's OCR editor.



Additionally, the text verification process can be much lengthier for documents containing several languages. If ABBYY misrecognizes something because it is checking against the wrong language, not only would that character have to be fixed, but any characters with diacritic marks need to be corrected using a separate window, which can be extremely time consuming.

Linking

If live links are present in the document, by default, ABBYY breaks the URL if the text covers more than one line upon export of the document. Additionally, if the URL spans multiple lines, then multiple incomplete links may be created. The IT support assistant typically converts them back into live links in Adobe Acrobat Pro after export.

Tagging with Adobe Acrobat Pro

Once the previous steps are finished, the document is exported for tagging. For a document to be exported with tags, in "Format Settings," the IT support assistant selects "Create PDF/UA," "USE MRC compression," and "Apply ABBYY PreciseScan to smooth characters." The "Image Quality" bar in "Format Settings" also allows him to determine the quality and visual appearance the PDF will

have after it has been exported. This is important because visual appearance can be noticeably degraded upon export.

Once the IT support assistant opens the accessibility tag tree in Adobe Acrobat Pro, he begins labeling and cleaning up the tags to best reflect the organization of the document and determines a comprehensive reading order. This includes labeling whether text in the document is, for example, a heading and, if so, its level, or a paragraph, block quote, or section. Although ABBYY allows him to determine the reading order of a single page at a time, it does not allow him to fix how data can be read when spread across pages. For instance, if a paragraph ends in the middle of a page by telling readers to view Table X, even though Table X is on a different page and the original page jumps to a different topic, the listener may be confused when the document seemingly jumps between topics and data. Tagging allows us to merge paragraphs that cross pages, correctly label tags to reflect their role, and organize the reading order more directly.

Tagging also allows for organization and labeling of tables with table headers and table data. Sometimes, it is necessary to invent solutions for table formats that the available tags cannot accommodate. For instance, one document had multiple tables with the same header titles; however, Adobe does not allow repeated content. The IT support assistant added numbers to the repeated header row cells to distinguish them from each other.

Moreover, the IT support assistant adds tags that allow assistive technology users to identify endnotes and footnotes and associate them with the relevant text in the document. As mentioned, live links are fixed in this step of the overall remediation process. Although they can be adjusted in ABBYY, Adobe Acrobat Pro allows users more control to properly edit links.

Tagging is complex and many guides exist. This outline covers highlights of some of the more common steps the IT support assistant takes.

WORKING WITH INDIVIDUAL STUDENTS

In 2024, several students with print disabilities asked the IT support assistant for assistance with course readings. Print disability is defined as “a person who cannot effectively read print because of a visual, physical, perceptual, developmental, cognitive, or learning disability.”²⁹ We agreed he should prioritize their requests, even when the materials were not in e-reserves. These requests have increased. Sometimes they come from individual students, sometimes professors, and sometimes the Office of AccessABILITY. Table 2 shows the number of courses and the number of PDFs remediated per semester for individual students.

Obtaining adequate citations to required readings from professors is often challenging for both HCL and the Office of AccessABILITY. We have been attempting to work with one school to establish a clearer process for faculty to provide citations.

The Office of AccessABILITY seeks textbooks from Bookshare, AccessText Network, and other sources, while the library checks its digital holdings, purchases copies when possible, or scans and remediates print materials. Beginning in spring 2026, we began using EBSCO’s new “accessibility support” option to obtain remediated versions of EBSCO PDF articles. The IT support assistant also remediates born-digital journal article PDFs.

Due to the focus on individual student needs and an unplanned librarian leave, e-reserves were not reviewed in fall 2024 or spring 2025. Checking resumed in summer 2025.

Table 2. Number of courses and PDFs worked on for specific students per semester.

Semester	Number of Courses Worked on for Individual Students	Number of PDFs Remediated for Individual Students
Fall 2024	4	83
Spring 2025	3	93
Summer 2025	2	45
Fall 2025	6	175
Spring 2026	8	80 as of 4-1-2026

OUTSTANDING QUESTIONS AND LIMITATIONS

We have many outstanding questions and areas in which we hope to further develop our work.

As focus has shifted to individual requests, staffing to adequately meet immediate needs is a concern. A well-known difficulty is adding page numbers to PDF files without causing screen readers to interrupt the flow of reading to announce the number as the user moves from one page to another. Initially, we omitted them for this reason, but recently we began adding bookmarks to some documents for accessible page numbering. Page numbers are needed by users with disabilities to follow professors' references.

Another well-known challenge is making math accessible within PDFs. The disciplines related to math have not used e-reserves, so we have rarely needed to make math accessible so far. The IT support assistant has occasionally used alt text to describe equations. In spring of 2026, several departments at HC jointly requested funding from the administration for a trial of MathType to build capacity to make accessible math.

We have been advised that software other than Adobe Acrobat Pro would make tagging much more efficient. However, we do not have funding for other software.

Another concern that the IT support assistant has noticed is the quality of OCR and tagging in vendor-provided documents. Our efforts generally focus on documents submitted by faculty rather than vendor-provided documents we locate in our collections. However, we may want to expand on this. We understand the research cited in our introduction shows quality of tagging in journal article PDFs is poor and that vendor-provided documents are covered by the new rule, as explained by the Department of Justice, Civil Rights Division, "If you have a contract, license, or other arrangement with another entity to provide public services for your government, you still need to make sure that those services comply with Title II."³⁰ We do not have staffing to fully remediate all content in our e-reserves. However, when working for a known individual student, the IT support assistant tags vendor-provided PDFs.

A related question is whether vendors would allow us to remediate and upload documents that we correct to e-reserves. Typically, we link vendor-provided documents to avoid potential conflicts with licenses. From JSTOR, we learned that we could remediate the accessibility of its PDFs and repost the remediated copy to e-reserves. Licenses and vendor policies on posting remediated copies of content to e-reserves are something to explore.

Devoting more time to supporting the faculty regarding accessibility when they submit readings would be ideal. An associated issue is that we did not write image descriptions, except advising

users to ask professors for explanations, as we consider faculty to be the experts capable of that. Also, since we are not staffed to remediate all e-reserves, this seemed like a practical division of labor. Increased communication with faculty regarding this need is important. However, in early fall 2025, the IT support assistant began writing descriptions for images whenever he deemed it practical and not overly complex. In spring of 2026, we asked faculty in two courses in which we knew a student with a relevant disability was enrolled to write image descriptions for complex images. The faculty were very helpful. One sent us image descriptions to add to PDFs. The other added image descriptions to a lengthy document herself.

A topic often discussed in digital accessibility organizations is the value of EPUB format over PDF. Originally, the librarian had concerns regarding copyrights and licensing for converting to EPUB. She contacted CUNY legal counsel and learned that, if the work was being used under fair use, conversion to EPUB would be considered acceptable. Learning how to do this conversion is another future direction.

CONCLUSIONS

Assisting their institutions with improving the accessibility of course readings may be a natural role for academic libraries. Locating or procuring the best quality original available is a critical task for which libraries are optimally equipped. Furthermore, if readings are available only in print format, libraries can create higher-quality scans than are likely to be produced when the task is left to individual faculty members. New regulations have clarified upcoming accessibility requirements for course contents; therefore, more campuses may be looking for departments to support their schools in meeting this responsibility. Although correcting OCR and tagging require time and expertise, libraries may want to demonstrate their value by supporting their campus in filling this fundamental need. While HCL's work requires continued improvement, we hope that our experiences in improving the accessibility of PDF files in our e-reserves may be useful for other libraries.

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DESCRIPTION OF AI USAGE

Chat GPT-5 was used to copyedit this paper's abstract, literature review, and "Working with Individual Students" sections. The prompt used was "please copyedit this to reduce word count and improve style for a peer reviewed journal." The first author carefully edited all AI output. An earlier draft of the paper was edited by a human professional editor.

ENDNOTES

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