PEARL: An Open Source Course Reserves and Reading List System

Executive Summary

The Private Academic Library Network of Indiana (PALNI) requests $149,893 for a two-year planning grant to complete the development of a prototype of an open-source reading list system, Personalized Easily Accessible Reading Lists (PEARL), that can be used to create reading lists and embed links to library resources and open-access learning materials into learning management systems (LMS). Over two years, this project will work toward releasing an affordable open-source tool that can connect to various library catalogs or discovery systems and be integrated into learning management systems using the Learning Tools Interoperability (LTI) standard.

The goal of the PEARL application is to provide the ability for college and university faculty, instructional designers, and library staff to assemble library collections materials (journal articles, books, streaming video, archival materials, etc.), open-access content, and more into course reserve reading lists for student access and use in learning management systems. The scope of the planning grant will be to develop the application primarily for use by academic libraries and consortia.

PROJECT JUSTIFICATION

College and university libraries increasingly provide required reading, learning, and course materials for academic courses, saving money for students, improving outcomes for students,[1] and reducing inequitable access to course materials.[2] Though commercial software exists that can be used to manage and integrate digital library resources into LMS, high software costs[3] can mean this software is unaffordable for many libraries. Some library services platforms and discovery systems lack tools to organize, manage, and integrate reading lists and course materials into learning management systems. This project would complete a prototype of an open-source solution for managing course reading lists that can be utilized with a variety of catalog and discovery tools and integrated into various LMS (e.g., Canvas and Blackboard) using the widely accepted LTI standard.[4] This would have a far-reaching impact because libraries with a variety of different systems would be able to integrate library resources and open-access materials into LMS, including libraries spanning K-12 and higher education environments.

The goals of this project align closely with NLG Objective 3.1, as this project would advance the ability of libraries of all types to integrate digital materials into online learning environments. This tool can be used to increase the visibility and usability of library collections in courses, and provide a simpler way for library personnel to work with faculty to select open educational resources (OER) or licensed content for courses.

PALNI has developed a proof-of-concept iteration of the proposed PEARL application using PHP and MySQL, designed to be compatible with the OCLC WMS / WorldCat Discovery system and Canvas. This planning grant will be used to more fully develop a prototype of the PEARL Application that will work with at least one other

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[1] Mullens, A. M., & Hoffman, B. (2023). The affordability solution: A systematic review of open educational resources. *Educational Psychology Review*, *35*(3), 72.
[2] Wimberley, L., Cheney, E., & Ding, Y. (2020). Equitable student success via library support for textbooks. *Reference Services Review*, *48*(3), 373-383.
[3] Zakharov, W., Gerrish, T., Li, H., Davis, A. L., & Little, E. (2022). Exploring the Electronic Course Reserves Management and Reading List Tool Leganto through the Lenses of Academic Librarians and Instructors. *Journal of Library & Information Services in Distance Learning*, *16*(2), 168-180.
[4] Clossen, A. (2018). Integrating the library in the learning management system. *Library technology reports*, *54*(5).

library services platform and/or discovery system (e.g., EBSCO's FOLIO and VuFind, Koha, and/or Ex Libris Alma/Primo) and at least one other learning management system (e.g., Moodle and/or Blackboard). The prototype's code will be made available as an open-source project with plans for future full development via consortial partnerships and a possible future IMLS Implementation Grant.

Why Access to Library-Based Reading Lists Matters

Library-based reading lists allow students to access required materials at no direct cost to them, saving money and improving equitable access to learning materials. Students who might not otherwise be able to afford textbooks do not have to struggle through a course without the required resources or drop the course because they do not have the materials.[5] Students find that library reading lists enhance their learning[6] and instructors find reading lists useful as a pedagogical tool.[7] Reading list tools help faculty organize assigned materials and ensure the Library has sufficient licenses and access to the materials they are assigning. By leveraging permalinks to library discovery systems, links to resources are more stable and less likely to break or be incorrectly copied. A central place for libraries and consortia to manage library reading lists provides insights into institutional curriculum and how library resources are used to support learning, aiding in collection management assessment. Embedding library materials into learning management systems promotes collaboration between faculty, librarians, and instructional designers.

National Need

There is a need for an open-source, flexible tool to enable libraries to manage reading lists of open and library-licensed materials that are used in courses. Current solutions, such as EBSCOHost's Curriculum Builder[8] and Ex Libris' Leganto software, are frequently tied to specific library services platforms requiring libraries to have a suite of products from the same vendor in order to use these reading list tools. Talis Aspire indicates compatibility with a variety of library systems, including OCLC's WMS, EBSCO's FOLIO, Ex Libris' Alma, Sirsi Dynix's Symphony, and Koha, but is only available via subscription and is not available as an open-source tool that libraries or consortia can install and manage locally. Many academic libraries are increasingly embracing open-access options, and there is national momentum in the Library community to build sustainable open-source library service platforms and discovery options.[9]

Many academic libraries work together as part of a consortium, which may provide centralized technical support, collaborative collection development, and other efficiencies. The PEARL application is unique in that it is designed with consortia in mind so that a single installation of PEARL can allow managing course reserve and reading list data for multiple institutions. The system is flexible enough that it can also be used by institutional systems or collaborating libraries, or by single institutions. Analytics will be designed for the ability to run consortia-level reporting on materials frequently used in reading lists in order to facilitate consortial acquisitions and collection development and ensure a sufficient number of licenses or copies to meet course

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[5] Zhao, Y., Satyanarayana, A., & Cooney, C. (2020). Impact of open educational resources (OER) on student academic performance and retention rates in undergraduate engineering departments. *American Society for Engineering Education,* Paper ID #32294.
[6] McGuinn, K., Stone, G., Sharman, A., & Davison, E. (2017). Student reading lists: evaluating the student experience at the University of Huddersfield. *The Electronic Library*, *35*(2), 322-332.
[7] Kumara, P. P. N. V., Hinze, A., Vanderschantz, N., & Timpany, C. (2023). Online reading lists: a mixed-method analysis of the academic perspective. *International Journal on Digital Libraries*, *24*(1), 23-44.
[8] EBSCOHost announced that Curriculum Builder will no longer be supported after December 31, 2024. https://connect.ebsco.com/s/article/EBSCO-Deprecating-Curriculum-Builder?language=en_US
[9] Breeding, M. (2023). 2023 Library Systems Report: The advance of open systems. American Libraries: May 1, 2023. https://americanlibrariesmagazine.org/2023/05/01/2023-library-systems-report/

needs. The system will also be designed so that libraries or consortia without dedicated development or IT staff would be able to install and maintain the software. In a time of shrinking collections budgets,[10] libraries must ensure that every dollar spent on resources will be used to directly further the educational mission of their institutions. PEARL will provide insight into the resources faculty are assigning in their courses and facilitate requests to purchase library resources to directly support classroom learning, all while saving students money by reducing textbook costs.

Accessibility and student privacy are core elements of the proposed PEARL application. The interface will be designed to be compatible with screen readers and other adaptive technology tools and meet or exceed ADA requirements for web accessibility. No identifying student data will be stored within the PEARL application, and the PEARL application will not have access to identifying student data, grade information, or any other FERPA-protected information.

Users

The PEARL application is designed with four user groups in mind:

1. *Library Personnel*
    a. Librarians and staff will configure the PEARL application to support the creation of instructor reading lists. Staff who support course reserves (library collections materials that instructors are assigning in courses) will be able to create reading lists for courses based on instructor requests for materials found in library catalogs. Reading lists can be restricted to particular courses so that only students enrolled in certain courses would be able to access the lists, which can be useful when material with a limited number of available licenses or 'seats' has been assigned.
    b. Library personnel who work in acquisitions and collections will be able to identify materials being assigned in courses that require purchasing or additional licenses to support course enrollment numbers. Lists can be copied or 'rolled over' to subsequent terms to enable reading lists to be pre-populated with materials previously assigned for their courses.
    c. At the consortial level, library personnel will be able to identify commonly assigned or used materials for consortial collection development.
2. *Course Instructors*
    a. Instructors will be able to search library catalogs or discovery systems and identify materials to assign to their courses, adding them to their PEARL reading lists. They will also be able to add OER or other freely available material from the web. They will be able to organize their reading lists in either linear format (e.g., readings or resources assigned by week) or material type (e.g., articles, books, videos, etc.). Instructors will be able to re-use reading lists across multiple courses, course sections, and terms, with the ability to customize each list.
3. *Students*
    a. Students will be able to view assigned course materials from within their LMS course by clicking a link to open the PEARL reading list. Students will be able to click links to access assigned library or OER material. The PEARL application is designed to anonymize student interactions with the reading lists, so no identifying student information will be stored within PEARL, protecting student privacy.
4. *Instructional Designers/ LMS Managers*
    a. Instructional designers working on the front line of course creation will be able to more easily find and integrate library, open-access, and other content into courses in a consistent way.

[10] Hinchliffe, L.J. (2022). Commentary: The future (budget) of the academic library. *Physics Today 75*(8): 10–11. https://doi.org/10.1063/PT.3.5048

Reading lists will facilitate dialog between faculty, librarians, and instructional designers by providing a common place to review and link course resources. The ability to copy and easily implement lists will aid in increasing the speed of bringing new courses to the classroom.

Example Use Case - How the PEARL reading list system can be used to reduce textbook costs and facilitate library collection use

PEARL Step 1: An instructor seeks to reduce textbook costs

A biology faculty member at Logansport State University, Dr. Sofia Hernández, has noticed several students each semester do not purchase or have access to her assigned textbook for her Biology 200 course. She has assigned the same textbook for several years, updating to newer editions as they come out. When she looks up the newest edition of her traditionally assigned textbook for the following fall semester, she is surprised to find the price has increased to nearly $200. Dr. Hernández has heard there is an initiative in the library to reduce textbook costs, so reaches out to her assigned subject librarian, Paul Williams, and they schedule a Zoom meeting to discuss possible options.

PEARL Step 2: Librarian/instructor collaboration begins

Paul tells Dr. Hernández that the Library has a new application, PEARL, which enables faculty to build course reading lists of library collection materials as well as open educational resources. Sharing his screen with Dr. Hernández, he logs into the University's course management system and locates Dr. Hernández's course shell for the next semester. Because Paul already has a librarian role in the LMS, he is able to access the embedded PEARL LTI application as a reading list editor. Clicking on the 'PEARL Course Materials' link, Paul then clicks on the "+" icon within the launched tool and creates a new reading list for Dr. Hernández' course. Once the new reading list has been created, a panel appears that allows Paul to search the Library's catalog from within the reading list tool. He begins searching the Library's catalog search within PEARL for recently published biology ebooks that might be useful in Dr. Hernández' course. Together over Zoom, Paul and Dr. Hernández add several possible resources from the Library's catalog to the reading list. They also add URLs to a few OER materials that their consortium has created.

PEARL Step 3: Library refines and ensures access

After the call, Paul reviews the list and notices that one of the assigned ebooks, "An Introduction to Cell Biology" is only a 1-user licensed title, meaning that only 1 student can access it at a time. He clicks a button to add a 'more licenses/copies needed' flag to the list and then clicks the "Submit" button, which alerts both the library's course reserve desk and the library's acquisition desk of the newly available list. Acquisitions staff receive the flagged alert for the title that needs more licenses and are able to purchase an unlimited license to the ebook, allowing an unlimited number of users to access the material.

PEARL Step 4: Students benefit

The week before the fall semester, Olivia Phan, a 2nd-year biology major, logs into her course LMS to check for syllabi for her courses. She's worried about finding good deals for her assigned textbooks because she's still trying to pay off her credit card balance from purchasing her previous semester's textbooks. She's hoping she can delay purchasing the books until she gets her next paycheck, which is 3 weeks into the semester. As she scans the syllabus for her Biology 200 course, she is surprised and relieved to see that no textbooks are assigned, but that the materials will be embedded into her LMS course. Exiting the syllabus, she sees a link to "Library Reserves" and clicks to open the list. There she sees links to several ebooks, articles, and an interactive study guide that all appear freely accessible to her (see Supportingdoc2.pdf *Figure 1: User Experience*). From the syllabus, she knows the first quiz will take place during the 2nd week of classes and knows she'll be able to prepare for it with the materials already available to her.

PEARL Step 5: Consortial data-driven acquisitions

Logansport State University is a member of a regional library consortium that works together to support library systems and manage system-wide collections. Amani Said, the affordable learning and OER coordinator for the consortium, runs a report in the PEARL system to identify the most commonly assigned books across the consortium. She sees 8 courses across 6 institutions are using the book “An Introduction to Cell Biology” but that there aren’t enough licenses to cover all of the 320 students enrolled in those courses. Reaching out to the ebook platform that offers the book, Amani is able to negotiate an ebook license for the book that covers the remaining institutions that are assigning it, as well as covers other institutions in the consortium that offer biology classes, and notifies course reserve and affordable learning colleagues across the consortia about the newly available resource. The following semester, she runs a new PEARL report and sees that now 15 courses across 11 institutions are assigning the book, providing access to a total of 675 students.

Partners

IndexData and the Partnership for Academic Library Collaboration and Innovation (PALCI) will serve as testing and consulting partners during this planning grant (*See Supportingdoc1.pdf, Letters of support*). Collaborating with PALCI provides an initial pool of 77 academic libraries as potential testing and consulting partners. During the grant period, we will identify additional testing partners, with a focus on working with an institution using EBSCO’s FOLIO system and/or the VuFind Discovery system. To do so, we will engage librarians through national and state listservs, the International Coalition of Library Consortia (ICOLC) community, and conferences. We will also seek institutions using Alma/Primo, WMS/WorldCat Discovery, Koha, and/or Aspen Discovery as additional consultative and testing partners. We intend to identify a range of different types of institutions interested in testing or providing feedback on the PEARL prototype developed during this planning grant to work toward a system that will be flexible and usable for many different types and sizes of institutions.

Technical Architecture

PALNI has developed a proof-of-concept tool of PEARL designed using the OCLC WorldCat Discovery system with WorldShare Management System (WMS) connecting to an LMS via the LTI protocol that currently has the following features:

- From within a learning management system with LTI 1.3 support, launch the PEARL application from within a course to create a reading list object for that course
- From within the launched LTI interface, search a library discovery system (WorldCat Discovery, in the case of the proof-of-concept) via the discovery system API
- Select items from the search results to add to the reading list, which is then stored within PEARL and embedded in the LMS course

The proof of concept tool is a PHP/MySQL application that leverages Tsugi framework, handling the LTI interaction between the LMS and the PEARL interface for searching library collections and adding items. The only LMS data stored in the LTI tool is a course identifier to associate the reading list with the course. The PEARL application will also be built to conform to 2024 1EdTech certification standards, ensuring the integrity of the LTI 1.3 connection to the LMS (*See Supportingdoc2.pdf, Figure 2: Technical Architecture)*. No “3rd party shim” will be used to bridge the PEARL application with LMS, to reduce the risk of security concerns.[11]

[11] 1EdTech (2023). 1EdTech Advisory on the Use of LTI Shims for Tool Integrations. https://www.1edtech.org/sites/default/files/media/docs/2023/1EdTech_Advisory_LTI_Shims.pdf

This planning grant will be used to further develop the proof-of-concept into a version of the tool that can be used with at least one other discovery system, as well as develop the following features:

- Store and organize items into a reading list object that is then embedded into the LMS course
- Ability for reading list creators to organize reading list items (e.g., chronologically by when they will be read in the course, or by format) using customizable subheadings
- Ability for instructors and students to contact the library for help from within PEARL and for instructors to request a physical item be placed on reserve from within PEARL
- Ability to instructors or library personnel to 'flag' items that need additional access (e.g., more physical copies ordered or more ebook licenses)
- Ability for instructors or librarians to add open web URLs and OER (found articles/YouTube/etc.)
- Ability for library personnel to add notices and information regarding copyright restrictions and licensing
- Analytics regarding items in reading lists with the following use cases in mind:
    - Ability for library staff and consortia personnel to create reports on items frequently found in reading lists (e.g., formats, highly used titles, etc.)
    - Ability for instructors to see how many times reading lists items have been clicked on
        - No personally identifying information (PII), such as student information, will be stored in PEARL. Clicks on PEARL reading list items will be counted anonymously (so instructors can see how many times an assigned reading has been read) with no identifying information associated with clicks.

Recognizing that many institutions may lack sufficient personnel to install and maintain complicated open-source software, PEARL will be built with the intention of easy deployment using Docker or similar widely-used platforms. Documentation, user, and administrator guides will be created to disseminate documentation as features are completed in each workstream. The software will be made available open-source through Github, Bitbucket, or similar open code repository sites. In addition, a project webpage and toolkit to support consortial-level adoption and implementation will be created on LibGuides and disseminated to the International Coalition of Library Consortia (ICOLC) community.

PROJECT WORKPLAN

Project Description and Design

The project staff will identify and collaborate with library and industry partners and consultants around the Pearl reading list application. The project team will use the results of these interactions to further the ability to vision, technically architect, develop, and implement the PEARL application.

Project Goals

The goals of the PEARL planning grant are to:

Extend

- a prototype of the PEARL application designed to work with at least two library services platforms (LSP) and at least two Library Management Systems (LMS)
- Create an installation, updating, and maintenance framework that requires minimal local IT support to install and maintain and could be managed by a library consortia staff member with limited programming or IT experience

Explore and Document

- at least three library discovery system API structures and queries necessary for use with an LTI library reserves reading list system
- installation, configuration and use (user guide) of the PEARL prototype application
- a roadmap for future development of PEARL and maintenance/sustainability plan

Communicate

- through a project webpage and toolkit to support consortial-level adoption
- with a white paper or scholarly journal article describing the PEARL application and its potential uses

Project Team

Project Staff (Project Director, Lead Application Developer, Project Consultants: Application, Content, UX/UI), LTI/EdTech Contractor, Software Development Contractor, Accessibility Contractor

Workstream I: Project Participants, Data Access and Security

Purpose: The Project Director will identify and consult with existing and additional project partners, consultants, and testers. This workstream will also focus on library discovery system/library service platform API research to inform the design of the application's settings and configuration options. This information will be used to build a flexible data storage architecture configurable for multiple discovery/library system APIs.

Mechanism: Documentation Review; Partner Consultations

Activities and Objectives (Year 1)

- **Identify and confirm project participants -** The Project Director will reach out to a variety of institutions and library consortia (public/private, large/small) to identify consulting partners who can provide feedback on development and features throughout the development process. These consulting institutions may also serve as software testers in later workstreams.
- **API analysis and documentation -** The Lead Application Developer will research discovery system APIs to develop a list of citation data points common to at least three discovery systems. PEARL will need to have flexible configuration options to work with a variety of library system APIs in order for PEARL reading list creators to be able to search for library materials and add them to their lists. This phase will review and document at least three total library discovery and/or service platform APIs to inform the next workstream.
- **Data access method -** Data access methods will be explored by the Lead Application Developer and the LTI/EdTech Contractor as the PEARL application will utilize LMS roles (such as instructor or student) to determine which users can edit reading lists. Instructors and other users who have permission to edit course information within the LMS will be able to edit associated PEARL reading lists.
- **Data storage security -** A process for securely storing all data that may be passed through the PEARL application will also be a focus of this initial workstream by the Lead Application Developer and LTI/EdTech Contractor. There is no intention of storing any PII within PEARL; this step will ensure that the PEARL application is designed only to store information about assigned course materials and resource links within the application itself.

Workstream II: Database and Administrative Features

Purpose: This workstream will focus on the structure and design of the PEARL database for reading list storage and management. This workstream will also focus on developing administrative views and configuration settings of the PEARL application.

Mechanism: Documentation Review; Partner/External Consultations, Focus Groups

Activities and Objectives (Year 1 & 2)

- **Database Architecture -** During this workstream, the Software Development Contractor and Content Consultant, and Lead Application Developer will design and develop the architecture of the PEARL database including mapping required metadata from library system, learning management, and discovery API's. The PEARL database will be designed with the intention that both institutional personnel and consortial personnel will need to access analytics about how PEARL is being used and which resources frequently appear on reading lists. The functionality to anonymously count clicks on reading list items will be developed in this workstream. Instructors may want to reuse the previous term's reading lists and copy them over to the next term, and this functionality will be developed during this workstream.
- **Administrative Features -** The Lead Application Developer and the Software Development Contractor will design and develop the administrative views and configuration options for the PEARL application based on research of library system APIs completed in Workstream 1.
- **Security -** The Lead Application Developer and LTI/EdTech Consultant will address security in this workstream, ensuring no student data is accessible or stored in the design for the PEARL application and that the PEARL application meets and exceeds requirements for FERPA data security compliance.

Workstream III: Accessible User Interface Design and Accessibility

Purpose: This workstream will focus on design and development of user interface views, including student views of reading lists. This workstream will be driven by accessibility, ensuring that all aspects of the PEARL application are designed to eliminate key barriers for users with disabilities.

Mechanism: Documentation Review; Partner Consultations, Expert Consultations

Activities and Objectives (Year 1 & 2)

- **User Interface -** The Project Director, UX/UI consultants and Accessibility Contractor working with focus groups will identify and design the user interface elements of the PEARL application. This will include interfaces for librarians, faculty, and students. Documentation review of best practices and expert consultation will be used to ensure the user experience is optimal.
- **Accessibility -** The Project Director, UX/UI consultants and Accessibility Contractor will use design best practices and consultations and/or software to create an accessible interface. PEARL will meet and exceed ADA, WCAG and Section 508 by seeking guidance from experts in this area.

Workstream IV: Acquisition Integration and User Support

Purpose: During this workstream one of the key needs that the PEARL application will address is the need for better integration of course reading list data with library acquisitions and collection development workflows.

Mechanism: Documentation Review; Partner Consultations, Expert Consultations

Activities and Objectives (Year 1)

- **Acquisition Integration -** The Lead Application Developer and Software Development Contractor with partners will design acquisition functionality to enable instructors/reading list creators to "flag" items that need more copies or licenses from the library. Library system acquisition/purchase request API integrations will be explored during this workstream.

- **User Support -** The ability for users to report broken links or otherwise receive assistance from within their PEARL reading list will also be developed in this workstream by the Lead Application Developer and Software Development Contractor. Configuration options will be designed to enable “flags” or other problems reported to be directed to the correct API and/or email address.

Workstream V: Reporting

Purpose: Through this workstream the project staff will consider reporting capabilities and needs associated with reading list contents and activities. Reporting will be examined from the instructor, librarian, and consortium perspectives.

Mechanism: Documentation Review; Partner Consultations, Focus Groups

Activities and Objectives (Year 1 & 2)

- **Report Architecture -** The Project Director, Lead Application Developer and Software Development Contractor with input from partners, will define, document, and wireframe the architecture and front end for reporting. Reportable data elements will be identified as well as the reporting data pull methodology. The data for reporting will not include elements that are personally identifying. Some initial data elements for analytics and reporting could include: institution name, course name/ID, URL or title of the resource, count of unique access clicks per link/resource, count of resource type/vendor/source, and requested/flagged for more copies.
- **Report Scoping -** The Project Director, Lead Application Developer and Software Development Contractor with input from partners and focus groups will vision initial reporting functionality to enable insights such as what materials are being used directly in courses for instruction and how often resources are used, provide analytics at the course level as well as the consortium level, and enable librarians and instructional designers to identify requested materials or where more copies are required.
- **Report Construction -** The Project Director, Lead Application Developer and Software Development Contractor will create and construct sample report templates.

Workstream VI: Pilot, Feedback, and Documentation

Purpose: This workstream will focus on testing PEARL in a pilot phase, particularly through outreach to consulting partners identified in Workstream I, and gathering feedback. This workstream will also focus on the dissemination of documentation and outcomes.

Mechanism: Documentation Creation; Partner Consultations

Activities and Objectives (Year 2)

- **Testing & Feedback -** UX/UI Consultants and the Accessibility Contractor will pilot test PEARL in a variety of environments and configurations. Project staff and partners will develop testing scripts, install the application, and verify functionality performs as expected. Feedback from testing partner focus groups will inform the project team of any issues to address or adjustments that need to be made.
- **Documentation -** The Lead Application Developer and Content Consultants will collate and finalize all documentation and code developed throughout the five workstreams and publish via Github, Bitbucket, or similar repositories. A public website including an installation toolkit will also be made publicly available.
- **Roadmap -** In consultation with partners, The Lead Application Developer and Content Consultants will complete a roadmap for future development and ongoing sustainability and maintenance to inform future work on the application.

- **Dissemination (Publication and conferences) -** The Project Director and the Lead Application Developer will write and publish a white paper or journal article describing the PEARL application and its potential uses to raise awareness of the tool and identify future partners interested in further sustainable development of the application. Proposals will be submitted for presentation at applicable conferences such as Code4Lib and/or ICOLC.

DIVERSITY PLAN

PEARL's design philosophy is driven by flexibility so that it can be used in a variety of environments and institutions. In order to achieve this, project staff will seek out consultative partners from diverse institutions to understand how the emerging landscape of LMS and library discovery needs to inform future PEARL development. PALNI is a diverse consortium of 24 supported institutions, including at least one Hispanic Serving Institution (HSI) (Goshen College). With the written support of partnership and collaboration with PALCI and Index Data we will have an additional sizable pool of varying institutions and industry expertise. Additional partners will be sought at the outset of the project. This project is especially interested in consulting with institutions that serve a high number of first-generation students and/or students who are most vulnerable to the impacts of high textbook costs.

PEARL will be built with accessibility for users with disabilities and/or users who use assistive technology in mind. During the workstreams focused on designing user interfaces, project staff will contact experts and organizations, such as Userway, for guidance in developing PEARL to meet and exceed ADA, WCAG and Section 508 requirements for accessible web technologies. During the planning grant phase, PEARL is not anticipated to handle any direct file hosting (e.g., PDF documents and others), so the accessibility of assigned readings themselves will be handled by existing hosts of library and open material to which PEARL will link.

PROJECT RESULTS

The deliverables of this planning grant will include:

- Build a prototype of the PEARL application designed to work with at least two library services platforms (LSP) and at least two Library Management Systems (LMS)
- Documentation of at least three library discovery system API structures and queries necessary for use with an LTI library reserves reading list system
- Documentation for installation, configuration, and use (user guide) of the PEARL prototype application
- A roadmap for future development of PEARL and maintenance/sustainability plan
- Project webpage and documentation toolkit to support consortial-level adoption and implementation
- A scholarly journal article and conference presentations describing and promoting the PEARL application and its potential uses

PEARL will address the national need for an accessible, open-source reading list solution that works with a wide range of library systems and enables consortia to work together more effectively to provide the resources and collections their institutions need. PEARL will advance digital inclusion and extend the visibility of library digital collections by embedding them where students and instructors need them most: directly where students are learning online in their learning management system. PEARL's analytics will help libraries build collections tied directly to faculty learning objectives, facilitate student learning via library collections, and support consortial collaboration and efficiency concerning shared collection development. The outcome of this early release will inform a possible future IMLS Implementation Grant that will support further application development, extend its integrations with additional systems, and continue ongoing sustainable development.

PEARL: An Open Source Course Reserves and Reading List System

		Year 1												Year 2											
		2024					2025													2026						
Stream		Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
I Participants and Data Access	Identify and confirm project participants																								
	API Analysis																								
	API Documentation																								
	Data access method																								
	Data storage security																								
II Database and Administrative Features	Database Architecture																								
	Administrative Features																								
	Security																								
III Accessible UI and Accessibility	User Interface																								
	Accessibility																								
IV Acquisition Integration and User Support	Acquisition Integration																								
	User Support																								
V Reporting	Report Architecture																								
	Report Scoping																								
	Report Construction																								
VI Pilot, Feedback, and Documentation	Pilot Testing & Feedback																								
	Documentation																								
	Roadmap																								
	Publication & Conferences																								

Digital Products Plan

Type: What types of digital products will you create?

The project will result in several different types of digital content. Written works will include documentation of the PEARL application related to the structure, installation and administration, and user interface. Partner consultation input, focus group feedback, and webinar notes will be captured and stored. Culminating project findings and summary results will be reported and documented. An article on the project will be written and submitted for publication. These documents will be Google Docs (with several download format options), web pages using HTML and XML, and possibly PDF. Articles written for publication will be stored as PDF and/or format required for publication. All written works will be made available in accessible PDF.

The prototype application currently consists of files in various languages including HTML, PHP, CSS, and Javascript. The LTI standard will be used for interfacing with the learning management systems and API connections to connect to library platforms and discovery interfaces. The TSUGI framework provides the LTI connectivity in the current prototype. The PEARL prototype database makes use of SQL and is designed in MySQL database software. OpenSSL is used to facilitate secure communication across the application. The project workstreams will determine future file types, platforms, and frameworks through the development architecture process.

Presentation materials created to disseminate the completed project work will be created in Google Slides (with multiple format download options) and made available as PowerPoint PPTX files.

Availability: How will you make your digital products openly available (as appropriate)?

A primary focus will be to eliminate or reduce barriers and any limitations for anyone to access the project materials produced. Written works, presentation materials, and articles will be made openly accessible through the PALNI Hyku repository and the project webpage. The project article will be submitted to open journals for publication. Application code and related documentation will be made available and published through Github, Bitbucket, or similar repositories. Presentation opportunities will provide another avenue for dissemination of the project outcomes. Mailing list communications both to the consortium ICOLC list as well as other relevant library and educational technology lists will be used to share the work completed through the project.

Access: What rights will you assert over your digital products, and what limitations, if any, will you place on their use? Will your products implicate privacy concerns or cultural sensitivities, and if so, how will you address them?

PALNI will own the resulting code from the project. Application code will be made openly available using an LGPLv3, AGPLv3, or most appropriate open license determined during the project. The license chosen will seek to avoid a commercial vendor lock-in scenario, but enable the code to be adopted, adapted, and integrated into other software projects openly. Written works, documentation, and presentation materials will be made available under a CC-BY license.

Any data gathered through focus groups, surveys, and notes will be stored in a non-public file system accessible by the project team. Summary data used for reports, presentations, articles, or other public-facing distribution will be anonymized or shared only with the consent of the individuals and institutions which should mitigate any potential cultural sensitivities.

Sustainability: How will you ensure the sustainability of your digital products?

Materials will be retained on the project web page. Archival preservation copies of written works in common file formats and application code will be stored in the PALNI Hyku repository. PALNI will curate these project works for a minimum of 5 years and application code for 5 years or until deprecated. Application code and related documentation will be made available and published through Github, Bitbucket, or similar repositories.