

ComPADRE is a network of digital collections of online resources for physics and astronomy education. Current collections include: High School Physics Teachers, Undergraduate Physics and Astronomy Students, General-Education Undergraduate Astronomy Instructors, Undergraduate and Graduate Quantum Physics Teachers, and Physics Education Researchers. Meeting the needs of these diverse communities requires an understanding of their core needs, flexible tools, and extensible technical architecture.

Item Management:

Item Management includes processes for adding items to the database, and tools for collections to add collection-specific details

- Submission – Any registered user can submit items for consideration
- Filtering – All submissions are viewed by a librarian for approval and routing to collections
- Tagging – Students add item-level metadata
- Approvals – Librarian approves metadata, collection editors add information and accept item for collection
- Link Checking – Item database is checked for broken links and size changes in items
- Cloning – Database items can be cloned to streamline addition of related materials
- **Repository**
- Features – Each collection can highlight items for their community for front-page display
- Annotations – Community-specific additional information or help for using resources
- Relations – Resources that can be used together can be connected in the item display

A repository is crucial for communities with important materials not reliably available online. The comPADRE-wide repository provides a place for these to reside. It can also be used as a mirror for resources.

- Multiple formats of a document can be presented
- Detailed tracking of document changes is maintained
- Related and supplemental items can be loaded in the repository
- Navigation to supplemental items and connections to the database record are immediately available
- Full-text search of repository items is available if desired

Sharing resources with other digital libraries and resource collections in Physics and Astronomy is crucial for supporting community needs

- OAI harvesting allows the sharing of ComPADRE resources with the broader NSDL audience
- RSS feeds from the collections of new and featured items will support disciplinary communities
- Federated search broadens the resources available to ComPADRE users

Infrastructure:

The ComPADRE technical infrastructure is built for rapid development of collections, reliability of service, and standards-based services

- 3-Tier Development – Independent development, staging, and production servers are used with controlled rollout (applications) and rollback (data)
- Data/Web Segregation – Separate data and web servers allow for data integrity and display response
- Dynamic Data Services – All services are provided by calls to the database
- Disaster Recovery – Data back-up and recovery and disaster recovery plans are in place
- **Inter-Library Collaboration**
- Metadata Standards – ComPADRE uses an IMS/IEEE-LOM based data structure with DC, NSDL-DC, OAI-DC crosswalks for harvesting
- Defined Vocabularies – Defined standard vocabularies, such as GEM are used where possible.
- An existing Physics and Astronomy Education vocabulary has been adopted for subjects
- Mapping and aggregation of vocabularies are used for communities with different terminology

Several communities place peer review of collection items as a high priority.

- Flexible review form structure for a range of collection-specific rubrics
- Permission settings for Editors, Associate Editors, and Reviewers
- Detail review process tracking
- Display ranking by Reviewed/Assessed status

Each community has an individualized style and information display targeted to its audience.

- Modular design enables rapid development of new collections
- Style sheets used for collection design
- Information display targeted to the vocabulary of the community

Registered users can bookmark resources for their personal use

- Resource citations in different formats are created automatically from the metadata
- Comments can personalize the entries
- Entries can be moved or copied between folders and users
- Public folders can be used for resource sharing and mentoring

Collection Management:

Collection Management tools include general features for community management and tools for specific community needs.

- **Peer Review**
- Logging – Detailed traffic and page view logging aids in usability testing and outreach efforts
- Surveys & Polls – One question polls and longer surveys are used to attract traffic and collect feedback
- Groups – Tool and feature permissions are maintained with a granular, object-oriented interface
- Collection Metadata Primaries – Collection-specific metadata primary values focuses
- Customized Tools – Communities have special needs specific to their interests. These are accommodated through customized tools built to connect to the general ComPADRE-wide infrastructure.

- Student Research Opportunities Database
- K-12 National Educational Standards
- Guest Reviewers and Columnists
- Teacher Mentoring
- Private Messaging System & Chat
- Discussion forum moderation
- Bibliographic citations
- **Individualized collection design**

User Features:

User features are designed for information discovery, storage, retrieval, and community discourse.

- User Submissions – Users submit materials for personal and community use
- Search/Browse – Interface tailored to the community, with Subject, Resource Type, Grade Level, and User Type emphasized
- **Filing Cabinet**
- Moderated Discussions – Discussion tools are used for general discussion, focused topics, and mentoring
- Private Messaging and Chat – Private or real-time communications needed for mentoring and community activities
- User Comments – Resource-specific comments from registered users
- User Reviews – Detailed user-submitted resource reviews, solicited or contributed
- Profile/Preferences – Personalization of the collection experience and community communications