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Understanding Information Behaviors Embedded in Learning Objects

A Case Study of DLIST, The Digital Library of Information Science and Technology

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URL: http://www.dlist.sir.arizona.edu/
Overview

- Present open source initiatives and software for creating repositories of Learning Objects.
- Highlight software methods and protocols for understanding information behavior.
- Explore how citation references & links are used by faculty and students.
What is DLIST?

- Primary objective is to create a web-accessible, open digital repository for the areas of Library and Information Science (LIS) and Information Technology (IT).

- Two areas of special emphasis
  - Information Literacy: Papers, Bibliographic Information Materials, Pathfinders, Tutorials
  - Informetrics: Research publications and accompanying data sets
Digital Library of Information Science and Technology

Search the Titles, Abstracts and Keywords

Browse
Browse the archive by Subject or Year.

Latest Additions
View items added to the archive in the past week.

Simple Search
Search the archive using the most common fields.

Advanced Search
Search the archive using a more complex range of fields.

Registered Users Area
Registered users may submit items to the archive.

Register
Register for an account (or reset a forgotten password).

Subscribe
Subscribe to the DLIST listserv and get email alerts.
DLIST Nuts and Bolts

- Eprints v.2.2
  - Developed at the University of Southampton
  - Eprints is used to build repositories of scholarly products
- Runs on Redhat Linux 7.2
- Uses Apache 1.3.26 with mod_perl and MySQL database
How is DLIST Different?

- Extended Eprints types beyond scholarly products of research to learning objects such as teaching materials.

- Materials that can be deposited include tutorials, syllabi, course outlines, lesson plans, interactive learning modules, datasets, pathfinders and bibliographies.
Advantages of depositing in DLIST

- Visibility and impact of deposited work increases.
- Barriers to access of materials in LIS and IT are lowered by making them freely available.
- A wide range of resources created by researchers and practitioners in LIS and IT are available.
- Global access to academic information is enabled as DLIST contents are accessible through the Open Archive Initiative Protocol for Metadata Harvesting.
Materials Included in DLIST

- Published papers
- Data sets
- Instructional and help materials
- Pathfinders
- Reports
- Bibliographies
Material Storage Format in DLIST

- Materials can be stored in the following formats.
  - HTML
  - Text
  - PDF
  - Postscript
  - Others (Microsoft *.doc, etc.)
Learning Objects

- Learning Objects are self-standing, reusable, discrete piece of content that meets an instructional objective.

- Learning objects may be tagged with meta-data so that users can easily identify and locate specific learning objects in a Web-based environment.
Advantages of Learning Object

- **Modularity**, which gives increased versatility and functionality.

- **Wider content availability** through greater community support.

- **Sharing and reuse** - more return for development investment.
Storage of LOs in DLIST

- To store materials in DLIST, user or author must be registered with DLIST.

- Submission can be done online through web accessible forms to upload the material.

- During submission, user enters metadata about the material: title, abstract, author, publisher, subject area, reference etc.
DLIST Deposit Process

Deposit Type

EPrint Type
Please select the most appropriate type for your deposit.
- Bibliography
- Book
- Book Chapter
- Conference Proceedings
- Conference Paper
- Conference Poster
- Dataset
- Departmental Report
- Guide
- In Collection
- Interactive Material
- Journal (On-line/Unpaginated)
- Journal (Paginated)
- Journal Article (On-line/Unpaginated)
- Journal Article (Paginated)
- Library Instructional Material
- Newspaper/Magazine Article
- Other
- Pathfinder
- Preprint
- Presentation
- Report
- Syllabus
- Technical Report
- Thesis
- Tutorial

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DLIST Deposit Process (contd.)

Bibliographic Information

Please enter the bibliographic data about your deposit. Fields marked with an * are fields that must be filled out before your deposit will be accepted.

Status *
Please state here whether your deposit has been published, is currently in the process of being published (in press), or has not been previously published.
- Unpublished
- In Press
- Published

Refereed
Please indicate whether this version of the work has been refereed below:
- Yes, this version has been refereed.
- No, this version has not been refereed.

Public Domain
If the document you are deposit is not your own but rather an old document that is now in the public domain, then please tick the following box. This will prevent your own name and address appearing with the document as the address for correspondence.
- Yes, it is public domain.
- No.

Authors *
Please enter the authors below. If there are more authors than available spaces, click on the 'More Spaces' button. To remove an author, just remove their surname from the surname box.

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Person ID:

URL: http://www.dlist.sir.arizona.edu/
URL: http://www.dlist.sir.arizona.edu/
Retrieval of LOs from DLIST

- Retrieval done in two ways:
  - Searching the archive using keywords such as title, author, subject area etc.
  - Browsing through the archive either by the subject or by year.
Number of records: 20


Leydesdorff, Dr Loet (2002) Indicators of Structural Change in the Dynamics of Science: Entropy Statistics of the SCI Journal Citation Reports. Scientometrics 53(1):131-159.


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Information Behavior

Three types of information behavior can be distinguished in digital libraries.

- **Information seeking**: the purposive seeking of information.
- **Information searching**: micro-level of behavior employed by searcher in interacting with systems of all kinds.
- **Information use**: physical and mental acts involved in incorporating information found into the person’s existing knowledge base.
Information Behavior (contd.)

- DLIST supports information searching and information seeking behavior.

- We are interested in understanding information use behavior.

- We are conducting a study to understand the phenomenon of academic citations – both creation and use.
Description of Citation/Mapping Study

- Currently enrolled 45 student volunteers who are enrolled in a web delivered course at the University of Arizona, and 10 faculty volunteers selected from the UCGIS & related web sites.

- Discipline is Geographic Information Science (GIS).

- Areas of subject coverage includes: Introduction to GIS, Geo-Visualization, Remote sensing using GIS, Land use and management.
Course Environment

- GEOG 416B is a hybrid/distributed course - distance + on-campus - at the University of Arizona.

- The objective of the GEOG 416B course is to give an orderly survey of GIS and introduce the language and practices of computer-assisted spatial analysis.

- The course includes three components:
  - Online - Interactive Learning Modules (ILM's)
  - On-campus - Lectures
  - On-campus - Labs
Interactive Learning Modules

- Computer based lectures, and main source of information about GIS theory.

- All ILM’s have a common basic structure.
  - Expected/Intended learning outcomes
  - Visualization objects (such as illustrations, maps)
  - Definitions of terms (tools such as glossary)
  - Quizzes to test understanding of concepts
Interactivities

- Need to understand how users interact with ILMs.
- Interactivities rather than interfaces or interactive learning environments emerge as a measurable way to design and evaluate.
- Interactivities are simply defined as interactivity that enhances learning.
- Interactivities are consciously designed and developed based on the pedagogical, technical, discipline, and social dimensions of interaction between users and system.
Study Description

- Three methods used for data collection:
  - 1. Tracking user’s link access & use patterns using in-house created transaction logging scripts.

- Three categories of links in ILMs are investigated:
  - Internal object links.
  - External web links.
  - Component citation reference links.
Study Description (contd.)

- Use intermediate server to track external links.
- External web links are redirected to intermediate server with URL to be opened as parameter.
- Server records user details, and URL visited by the user, and redirects the user to the URL.
- This process completely transparent to user.
- Internal links are tracked by WebCT.
Description (contd.)

- 2. Participants complete online surveys about all three types of links investigated.
  - Demographic survey
  - Survey for faculty - to probe the phenomenon of academic citation and linking (content creation).
  - Survey for students – to understand the usage of academic links.

- 3. Follow-up focus group interviews with faculty and students to verify data and fill-in the gaps.
Discussion of Results

- Results are anticipated – study is currently underway

- Findings about PageRank and WebStructure have an impact on our investigation into Information Behaviors associated with citation reference links in learning objects
PageRank

- Google search uses a feature called PageRank.
- PageRank models user behavior and access patterns.
- PageRank assigns ranks to web pages so that search results can be prioritized.
- The rank of a web page depends on the number of other web pages that point to it, or link to it.
Power Laws and Structure of Web.

- Power law distributions have been observed in various aspects of the web.
- Power laws have been known to characterize user behavior in the web.
- In-degrees and out-degrees have power law distributions.
- Since in-degrees and PageRank are closely related, in-degree distributions induce similar distributions on browsing activity and access statistics.
Relation to our Research

These technologies can be related in two ways.

First, we can model user behavior in the creation and use of learning objects. This is due to the structure of the web as seen above in the power law discussion.

Second, the PageRank feature can be applied to the DLIST repository too. Here instead of links as in web pages, PageRank can be computed by tracking the citations.
Research Applications

1. ILMs will be added into DLIST

2. Citation indexing and improved search mechanisms will be implemented in DLIST

3. Findings from study will feedback into re-vision and re-design of ILMs
Future of DLIST

- Long term sustainability and funding to build a trusted repository.
- Focus collection development on a 'digital core' collection for LIS.
- Implement citation indexing.
- Implement the Greenstone Digital Library full text search.
Future of DLIST (contd.)

- Develop and make available policies for metadata, collection development, and use.
- Address intellectual property concerns by providing copies of publisher agreement.
- Add subject editors to maintain quality and oversee deposits.
- Separate collections within the archive.
Conclusion

- DLIST is a web-accessible, open, digital repository for the areas of LIS and IT.

- DLIST is unique among current repositories in that it extends the Eprint types to include LOs and teaching materials.

- We have presented the software methodologies and protocols for studying instructional user behavior with citation references and web links.
The End!

- Thank You!
- Contact: asc@u.arizona.edu or skarthik@u.arizona.edu