August 2004

Citation Indexes for Online Interdisciplinary Learning

Anita Coleman
University of Arizona, acoleman@lpts.edu

Citation Indexes for Online Interdisciplinary Learning

Anita Coleman

University of Arizona

Overview

- Citations (also known as references) acknowledge the intellectual uses of others' work and represent scholars' influence and impact.
- Web links in adaptive hypermedia systems, like the WWW, make the cited material immediately accessible for novice learning.
- How can web links serve as socio-cognitive instruments and what will citation indexes for online, interdisciplinary learning look like?

GIS Web Links Study

- A study was undertaken to investigate the student use of citations and web links in Geographic Information Science (GIS)
- Debate about GIS
  - Geographic Information Science or Geographic Information System?
  - A tool or a science?
- There is consensus about the multi- or inter-disciplinary nature of GIS

Study Questions

- What are the different types of citations & web links that can be found in instructional materials?
  - Online teaching materials have a rich set of citations and hyperlinks.
- Why do students use citations and web links?
  - Citations and web links in learning materials serve as instruments of cognition.

Study details

- Senior year undergraduates and Masters and PhD (n=26-45)
- Course: Introduction to GIS
- Methods of Delivery:
  - Traditional Classroom (lectures – n=90)
  - GIS Lab (*ArcView* and *ArcInfo*)
  - Interactive Learning Modules (ILM) in WebCT

Methods to collect use/user data

- Online surveys
  - Demographic survey
  - Survey about each ILM
- Focus group interviews
  - Gather data and verify gaps in surveys
- Logs
  - Customized scripts for following the user as they followed web links and navigated within WebCT
    - Navigational links and other functional links disregarded

Data analysis

- Use/Non Use Counts and frequencies
  - How many students used or did not use web links?
  - How many web links used/not used?
  - How often were they used/not used?
- Nature of web links
  - Pre-existing categorization schemes were chosen (Duncan et al, 1981 and LCSH, 2000)
  - Categorization of Form (type), Content (+ label), Context (purpose)

Results – Nature of web links

- GIS (not unusually) is a visually rich discipline and there were a total of 130 images in the ten ILMs.
- No web link was used to criticize or dispute.
- Instead the predominant **contexts** (instructional purpose) were 1) definition, 2) explanation, 3) example, and 4) illustration.
- The predominant **form** is books.
- The predominant **text content** is quotation followed by **images**.

Results – Use/Non Use

- Use/Non Use
  - The number of students who did not use the citations and links is greater than those who used them.
  - Citations (I.e traditional bibliographic citations not linked to full-text as web links) were not used at all
- Reasons for Non Use
  - Ranged from technical problems faced by student in learning WebCT to time management

Reasons for Use

- Starting points: “Citation offers a starting point from which to become really familiar with the history and information about GIS.”
- Further details: “I wanted to receive more information about what ArcView has to offer.”
- Clarification: “I was curious to know more about Ian McHarg. Confused because I thought he did something else.”

Rudiments of cognition

- Written comments analyzed in terms of
  - Anxiety
    - Web links generated greater negative responses
  - Arousal
    - Ambivalent results
  - Attention
    - Some web links were good at this (interactives)
  - Motivation
    - Stimulated curiosity in some and presented nothing new to others
  - Self-regulation – as above (for motivation)

Results from focus groups

- Probed reasons for use/non use and how citations and web links can further learning
  - *Categorize* in terms of *Required, Recommended* and *Optional* (Reading Lists)
  - *Present* citations as web links
  - *Highlight web links (current mechanisms inadequate)*
  - *Compile* (not just embed)
  - *Integrate* different computing environments
  - *Rate* and *make explicit* the *quality* of web links
  - *Increase citation searching awareness (expert skill)*

Remarks

- We know a great deal about use of citations by researchers and we also know a great deal about student information and learning behaviors.
- Less is known about how components such as web links affect student learning.
- The evidence appears to be mounting that cognitive overload (like information overload) is a very real problem to students and students and both information organization and visualization displays need to be improved.

More remarks

- The instructor designing the ILMs was very sensitive; there are only 16 bibliographic citations (five unique) and 20 web links. Yet many did not use them.
- System features for WWW 1) to generate citation lists and indexes from hyperlinks embedded in learning materials and 2) improve web link displays and labeling.

Recognition of teaching

- Citation indexes play an important role in the evaluation and assessment of research
- Learning/User Citation indexes have the potential to inform peer review committees of the innovations and productivity of teaching faculty

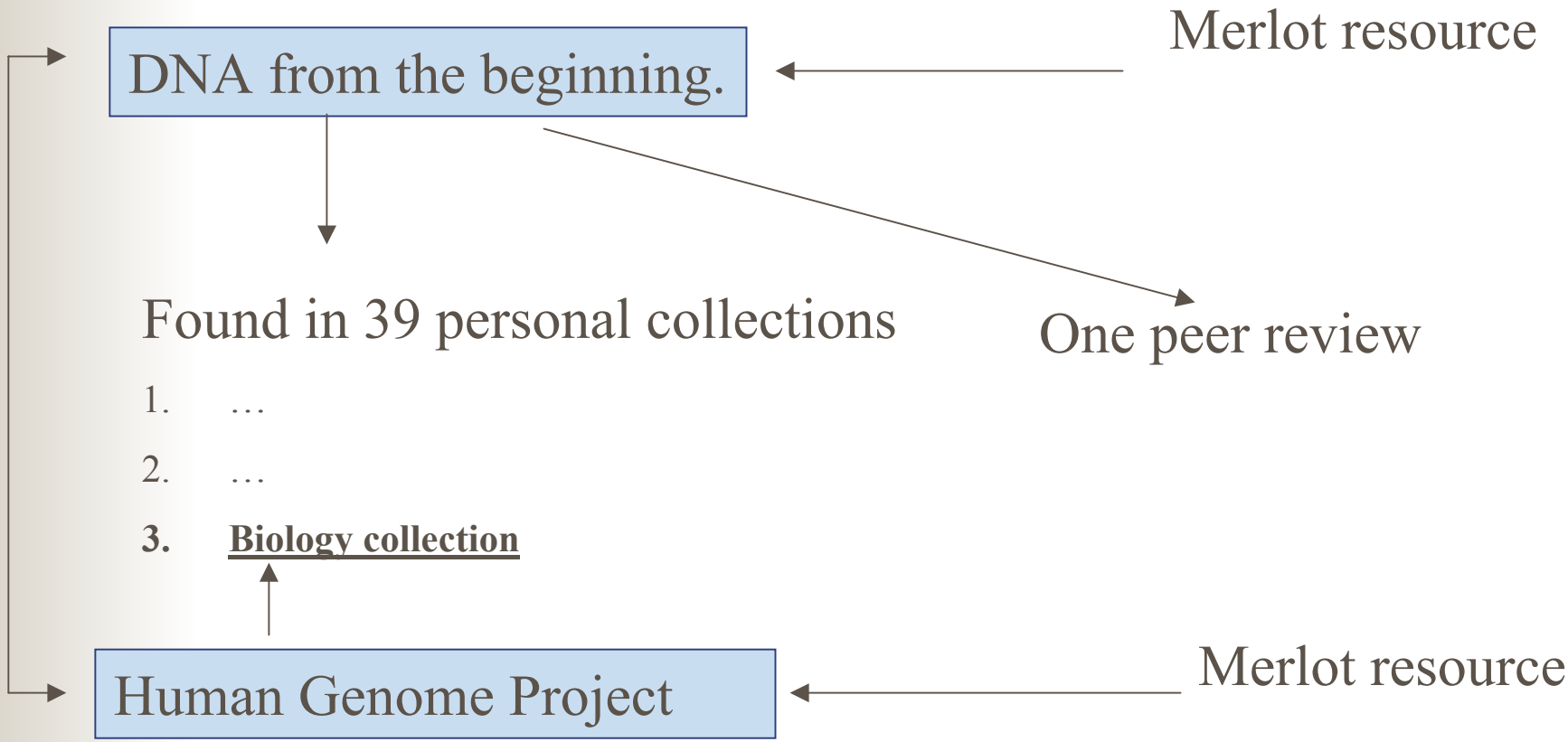
Outstanding questions

- Why? (the so what question)
  - Card catalog studies - no ‘oral citations’
  - Citation studies - ‘concept symbols’ and ‘discipline-oriented discourse communities’
  - Adaptive hypermedia, instructional design, information behavior studies - Web links are information pathways making greater amounts of information available at clickpoint; Learning is not being helped by current mechanisms for web links
- How and What? (the implementation questions)
  - How can this be done and what should be indexed?

User citation indexes for learning

- Building or developing citation indexes for learning materials and educational users
  - In educational digital libraries such as MERLOT, instructional materials created by one may often be used by many.
  - Can this "learning/teaching use citation" be captured?
    - Can annotation, review, personal collection frameworks be leveraged for this?
    - Can 'instructional use (citation) indexes' be developed around this framework?
    - What will 'user citation indexes" look like?

Indexing relationships



References

- Coleman, A. Instruments of cognition: Use of Citations and Web Links in Online Teaching Materials. To appear in *Journal of the American Society for Information Science and Technology*.
- Coleman, A. 2003. Mapping the intellectual structure of Information Science and Information Technology: A Study of Geographic Information Science. American Society for Information Science and Technology (ASIST) 2003 Annual Meeting, Oct. 20, 2003, Long Beach, California. [Available online]
- Duncan, E. et al. 1981. Qualified citation indexing: its relevance to educational technology. In E. B. Duncan and R. McAleese (Eds). Information retrieval in educational technology: conference proceedings of the first symposium on information retrieval in educational technology held at ETIC'81, Aberdeen, Scotland, 1st April, 1981 (pp. 70-79). Aberdeen, University of Aberdeen.

Acknowledgments

- This study was funded by the AZ Prop 301 (Arizona Center for Information Science and Technology, University of Arizona)
- Dr. Stephen Yool, Dept. of Geography and Regional Development, University of Arizona
- Study participants
- GATs and Instructors (A. Clarke, S. Karthik, K. O'Neal, P. Waterinck, and S. Yu)

Thank You!

- Contact information:
  - Email: asc@u.arizona.edu
  - Website: http://www.u.arizona.edu/~asc
- The End