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# Citation Indexes for Online Interdisciplinary Learning

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# Citation Indexes for Online Interdisciplinary Learning



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# 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 interdisciplinary 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

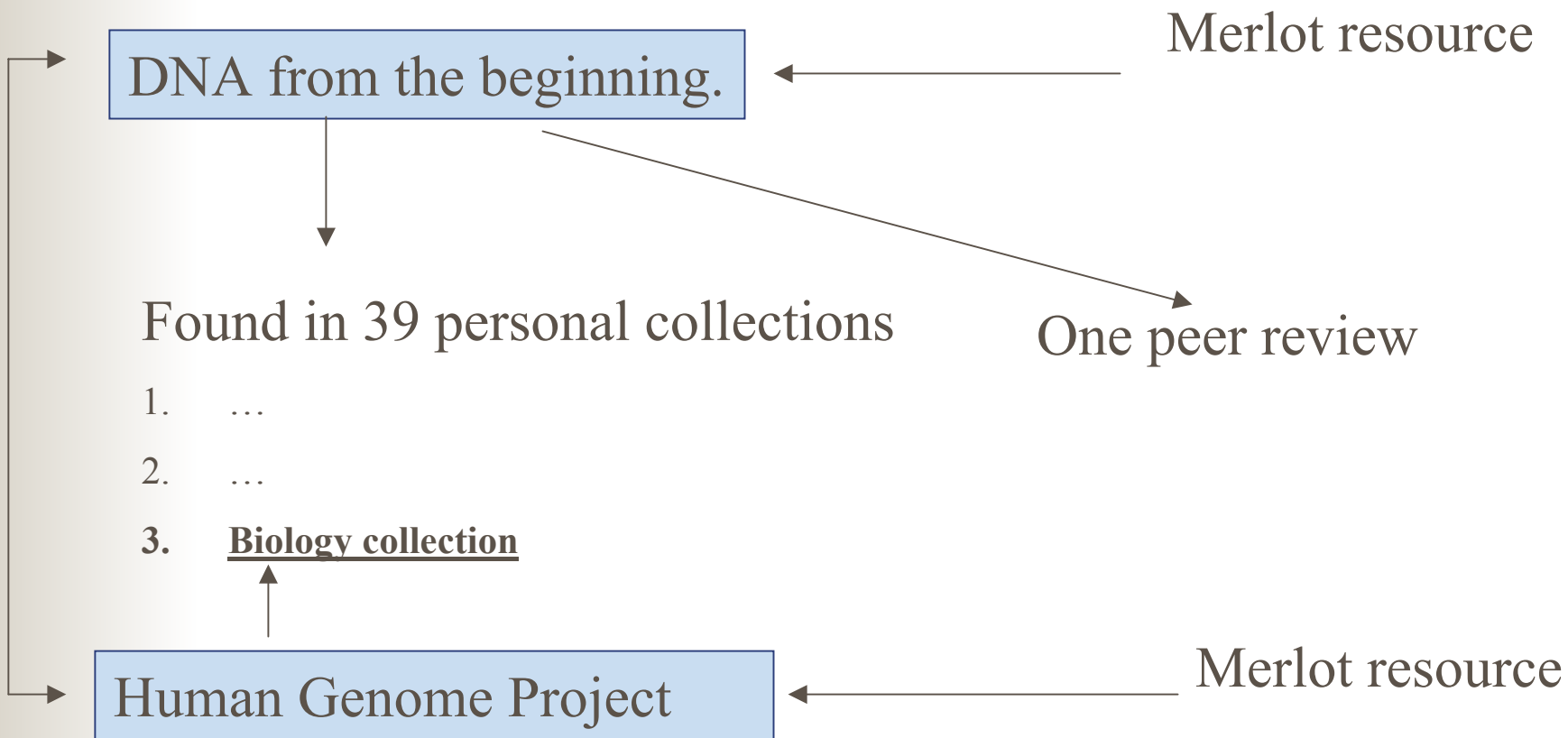
- Why? (the so what question)
  - Card catalog studies - no ‘oral citations’
  - Citation studies - ‘concept symbols’ and ‘discipline-oriented discourse communities’
  - Adaptive hypermedia, instructional design, information behavior studies - Web links are information pathways making greater amounts 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





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Thank You!

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- The End