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Information Technology, Cognition, and Communication

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Abstract

Information technology is varied and human use and impact can be examined at different levels. I will report on two studies that examine IT at very different levels: 1) the ubiquitous hyperlinks as instruments of cognition in e-learning, and 2) digital repositories as networks and invisible colleges of scholarly communication.

Outline

- Background
  - Information & Communication Technologies (ICTs) rather than IT, academic disciplines or sub-disciplines, and my own background
- Instruments of cognition
  - Study, findings, limitations, and future work
- Communication colleges
  - Brief look only (not covered)
- Q&A (importance)

ICTs

- Information and Communication Technologies
  - Technologies
    - laptops, wireless networks, Internet, digital objects, digital resources, Adobe Acrobat reader, digital libraries, digital repositories
  - Uses of ICTs
    - at work, for play, at home
    - Public administration
    - Learning
  - Users of ICTs
    - usually studied in groups & contexts
    - students, architects, citizens

Other aspects & approaches

- Barriers (example: access)
- Social informatics
  - Social aspects of computerization (CRITO)
- CMC
  - Computer-mediated communication (Lee Sproull & Sara Kiesler, *Connections*)
- HCI
  - Human computer Interaction

Library/Information Sciences

- Organization of Information
  - Bibliography, Cataloging, Classification, Controlled Vocabularies, Indexing
- Human Information Behaviors
  - Information needs, Uses of Information, Information Seeking behaviors
- Scholarly Communication
  - Bibliometrics, Informetrics, Scientometrics, Librametry
- From Information Retrieval (IR) to Information Architecture (IA)

Research interests

- Complex objects (networked digital information)
  - Digital resources
    - Learning objects
    - Scientific models
    - Interactives
  - Embedded small technologies
    - Hyperlinks – this is a hyperlink
    - Citations – as Web links
- Human Information Behaviors
  - E-learning, interdisciplinary contexts
  - Interaction behaviors

Instruments of Cognition

- "Citations provide pellets of the peer recognition that is central to the normative reward system of science." Merton (2000, p. 438)
- Citations serve two different functions
  - Symbolic institutional
    - maintains the character of scientific intellectual property
  - Instrumental cognitive
    - Leads readers to assess the validity claims made in the citing paper

Research Questions

- What are the different types of citations and web links that can be found in instructional materials?
- Why do students use citations and web links?

Data Collection & Analysis

- Citations and Web links
  - Counts
- Citation and link content/context analysis
  - Categorization
- User study
  - Two types of written surveys and follow-up focus group interviews
- Usage tracking
  - Monitoring student activity on Web links in the course pages

The Course & Materials

- Spring 2003, Course based in the Geography & Regional Development Dept., College of Social & Behavioral Sciences
- On-campus + Interactive Learning Modules + Labs
  - ILMs provide the theory and the labs the practice; the on-campus, real-time lectures served as the bridge between theory and practice.
  - 10 ILMs, Glossary, 12 lectures, 12 labs; No text
  - Each ILM had a similar structure

The Participants

- 45 students participated
- Total class enrollment of 90
- Full participation turned out to be lower: mean n=26

Findings - Demographics

- The typical student in this GIS course was
  - Male
  - Caucasian
  - Undergraduate senior
  - In the age group of 20-30
  - Was from out-of-state
  - Majoring in Regional Development
  - Worked fewer than 20 hours a week in a job

Findings - Nature of C & W

- 10 citing documents (ILMs)
  - Size: 50.2 MB
  - Glossary had 315 terms
  - 16 bibliographic citations and 20 Web links (navigational links not included)
- Previously established categorization scheme (Duncan et al, 1981) of form and context (Implied purpose of the link)

Nature of citations

- Form
  - 16 citations
    - Books
    - Illustrations (130)
- Context
  - Definition
  - Example
  - Illustration

Nature of Web links

- Form
  - 20 links
    - 8 *.edu, 8 *.gov, 2 *.org, 2 *.com
- Context
  - Historical, Biographical information; Further detail; Data; Example
- Content
  - URL; Text; Graphic, Directive

Results - Use and Non Use

- The number of students who did not use the citations and links is greater than those who used them.
- 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 about Ian McHarg. Confused because I thought he did something else."

Reasons for non use

- Time constraints
- Information overload
- Uninteresting
- Familiarity
- Irrelevance
- Information elsewhere
- Technical problems

Cognitive Instruments

- Written comments analyzed in terms of five rudiments of cognition.
- These include:
  - Anxiety
  - Arousal
  - Attention
  - Motivation
  - Self-regulation

Summary

- Citations did not generate anxiety; links generated a greater negative or apathetic response
- Simplistic conclusion: citations and links don't arouse.
- In general citations didn't gain attention but when they did it was to trigger a memory recall function; some web links were successful in gaining attention
- Exploratory learning behaviors stimulated by self-regulation

Suggestions

- Categorization of links as required, recommended, optional
- Present citations and web links as web citations
- Highlight citations and web links distinctively
- Compile lists (Lists of examples)
- Integration of IT environments
- Rate the quality of the citations and web links

Limitations & Challenges

- Small study
  - Participation rates fluctuated
- Human subjects
  - Too many protocols
- Technical problems
  - Usage tracking with monitoring software turned did not really work
- Presentation of results
  - Negative findings about ICTs are not well received by anybody ☺
- Infrastructure for E-Learning research
- Collaborative research needs

Future work

- Expand the study
  - More students
  - More courses (and more of conscious design)
  - More disciplines
- Investigate options for partnering
  - CRITO
- Establish a test bed for e-learning (integrating digital libraries & learning)
  - SDSC + NSDL

Scholarly Communication

- Use of IT for scholarly communication
  - Invisible colleges (communication colleges)
  - Specific technology: Digital Repositories – Open Access Archives
  - DLIST (Digital Library of Information Science & Technology) http://dlist.sir.arizona.edu/

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The End!

- Thank you!
- Q & A
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