

May 2005

Information Technology, Cognition, and Communication

Anita Coleman
University of Arizona, acoleman@lpts.edu

Follow this and additional works at: https://scholarworks.sjsu.edu/slis_pub



Part of the [Library and Information Science Commons](#)

Recommended Citation

Anita Coleman. "Information Technology, Cognition, and Communication" *Center for Research on Information Technology and Organizations (CRITO)* (2005).

This Presentation is brought to you for free and open access by the School of Information at SJSU ScholarWorks. It has been accepted for inclusion in Faculty Publications by an authorized administrator of SJSU ScholarWorks. For more information, please contact scholarworks@sjsu.edu.

Information Technology, Cognition, and Communication

Anita Sundaram Coleman
Asst. Professor, SIRLS
University of Arizona, Tucson



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/>



References

- Coleman, A. 2005. Instruments of cognition: Use of citations and Web links in online teaching materials. *Journal of the American Society for Information Science and Technology* 56 (4): 382-392. Preprint available online: <http://dlist.sir.arizona.edu/archive/00000806/>. Last retrieved: 12 May, 2005
- Duncan, E. B. Anderson, F.D., & McAleese, R. 1981. Qualified Indexing Online? In M.E. Williams & T.H. Hogan (Eds.). *National Online Meeting, Proceedings, 1982*, (pp. 77-85). Medford, NJ: Learned Information.
- Kling, R., Crawford, H., Rosenbaum, H., Sawyer, S., and Weisenbrand, S. 2000. *Learning from Social Informatics: Information and Communication Technologies in Human Contexts*. Available online: http://www.slis.indiana.edu/SI/Arts/SI_report_Aug_14.pdf. Last retrieved: 18 May, 2005
- Merton, R. K. (2000). On the Garfield input to the sociology of science: A retrospective collage. In B. Cronin and H. Atkins (Eds.). *The Web of knowledge: A Festschrift in honor of Eugene Garfield* (pp. 435-448). Medford, NJ: Information Today.
- Sproull, L. and Kiesler, S. (1991). *Connections: New ways of working in the networked organization*. Cambridge: MIT Press.



References (in live talk)

- Cole, Jonathan R., and Cole, S. Peer Review in the NSF: Phase 2. Washington D.C.; National Academy of Sciences, 1981.
- Cole, S. and Cole, Jonathan R. (1981) "Chance and Consensus in Peer Review," *Science*, 214: 881-86.
- Dervin, B. (1984). *The Information Needs of Californians, 1984: Report #2: Context, summary, conclusions, applications.* Sacramento, CA: California State Library. (ERIC Document Reproduction Service No. ED 267 801.)
- Savolainen, R. (1995). *Tiedonhankinnan arkipäivää: Vertaileva tutkimus teollisuustyöntekijöiden ja opettajien arkielämän tiedonhankinnasta elämäntavan viitekehäksessä (Everyday life information seeking: A comparative study of the everyday life information seeking of industrial workers and teachers in the context of way of life).* Tampereen yliopisto [University of Tampere], Tampere, Finland (1995) (Tampereen yliopisto. Informaatiotutkimuksen laitos. Tutkimuksia n:o 40/University of Tampere. Department of Information Studies. Studies 40). As reported in various other studies of Savolainen.
- Zuckerman, H., Cole, J.R., and Brues, John T. (1992). *The Outer Circle: Women in the Scientific Community.* New Haven: Yale University Press.



The End!

- Thank you!
- Q & A
- Contact: asc at u dot arizona dot edu
- URL:
[Http://www.u.arizona.edu/~asc](http://www.u.arizona.edu/~asc)

