

HICSS-43

The Role of Anchoring Discussion in Mediating Effective Online Interaction for Collaborative Knowledge Construction

January 6th, 2010

Evren Eryilmaz, J. van der Pol, Sumonta Kasemvilas,
Justin Mary, Lorne Olfman

Claremont Graduate University (USA) and Utrecht University (NL)

Presentation Outline

- Introduction
 - Motivation
 - Problem Statement
 - Goal & Approach
- Technology as Medium
 - Anchored Discussion System
 - Stakeholder Controlled Networking System
- Theoretical Perspectives and Methodologies
 - Social Constructivism-Content Analysis
 - Distributed Cognition-Sequence Analysis
 - Contextual Influence Model-Social Network Analysis
- Research Questions & Hypotheses
- Key Findings
- Conclusion and Current Work

Motivation

- Why Study Collaborative Knowledge Construction?
 - The central purpose of education is learning to think (Dewey, 1933)
 - Dialogue serves as an instrument for the development of thought (Vygotsky, 1978)
 - Research has demonstrated that collaborative knowledge construction via dialogue can enrich student conceptual understanding (Chinn, 2006)

- What is the Merit of Asynchronous Online Communication in Collaborative Knowledge Construction?
 - The medium offers opportunities for externalization and internalization of knowledge elements
 - The process can become more powerful in written form (Pena-Shaff et al., 2004)
 - The medium provides time to be reflective and deliberate

Dewey, J. (1933). *How we think*. New York: Prometheus Books

Vygotsky, L.S. (1978). *Mind in society*. Cambridge MA: Harvard

Chinn, C. (2006). Learning to argue. *Collaborative learning, reasoning, and technology*: pp. 355–383.

Pena-Shaff, J. and C. Nicholls (2004). Analyzing student interactions and meaning construction in computer bulletin board discussions. *Computers & Education* 42(3): 243-265.

Problem Statement

Two Difficulties of Asynchronous Online Communication:

- 1) Insufficiency of coherent and interactive dialogue
 - Discussions tend to have many individual monologues (Weasenforth et al., 2002)
 - Interactions largely deal with surface level knowledge (Häkkinen et al., 2004)
 - Discourse can easily become incoherent and disorganized (Andriessen, 2006)

Weasenforth, D., Biesenbach-Lucas, S., Meloni, C. (2002). Realizing Constructivist Objectives through Collaborative Technologies: Threaded Discussions. *Language, Learning & Technology* 6(3).

Häkkinen, P., Arvaja, M., and Mäkitalo, K. (2004). Prerequisites for CSCL: research approaches, methodological challenges and pedagogical development. *Learning to Collaborate and Collaborating to Learn*, Nova Science Publishers, New York, NY: 161-175.

Andriessen, J. (2006). Collaboration in computer conferencing. *Collaborative Learning, Reasoning and Technology*: 197-231.

Problem Statement

Two Difficulties of Asynchronous Online Communication:

2) Low and unequal levels of participation among group members

- Learners can adopt the role of lurker rather than active participation (Hara et al., 2000)
 - Struggle with the development of a sense of interdependence within online groups (Dirx and Smith, 2004)
 - A lack of individual accountability referred to as “social loafing” (Leow, 2000).

Hara, N., C. Bonk, and Angeli, C. (2000). Content analysis of online discussion in an applied educational psychology course. *Instructional science* 28(2): 115-152.

Dirx, J. M., & Smith, R. O. (2004). Thinking out of a bowl of spaghetti: Learning to learning in online collaborative groups. In T. S. Roberts (Ed.), *Online collaborative learning: Theory and practice* (pp. 132-159). Hershey, PA: Information Science Publishing.

Leow, R. P. (2000). A study of the role of awareness in foreign language 'textautospace: none'. Levine, J. M., Resnick, L. B., & Higgins, T. (1993). Social foundations of cognition. *Annual Review of Psychology*, 44, 585-612.

Goal & Approach

- Goal:
 - Promote rich and constructive interactions in online learning conversations
 - Design of software tools to support cognitive processing and active construction of knowledge
- Approach:
 - Quasi-experimental design to investigate the aspects of two artifacts design
 - Fine-grained analysis of discourse in each system

Technology as Medium

Anchored Discussion System

- Online presence of the learning material
- Shared frame of reference for individual messages
- Collection of multiple messages referencing a given topic

The screenshot displays a web browser window with a discussion thread on the MIS Quarterly website. The browser's address bar shows the URL <http://www.misq.org/roadmap/standards.html>. The page title is "Discussion". The main article is titled "Research or Theory and Review Article?" by Doris Shimabukuro. The article text discusses MISQ's manuscript categories and the concept of mindfulness in organizational literature. Below the article, there are several replies from users: Doris Shimabukuro (08-12-08), Anaga Sunny Ojo (08-12-08), Oluola Samuel-Ojo (13-12-08), and Mark Mingyi Young (15-12-08). The replies express gratitude and agreement with the article's content. The main article is categorized as "Research Article". The article title is "Innovating Mindfully with Information Technology". The author is E. Burton Swanson, from The Anderson School, University of California, Los Angeles. The article is grounded in its own organizational facts and specifics, contrasting this with mindless innovation. The article discusses the concept of mindfulness in organizational literature and its application to IT innovation. The article concludes by suggesting several promising new research directions. The keywords are "Information technology innovation".

Technology as Medium

Stakeholder-Controlled Networking System

- The authors can grant access to their contributions on a number of levels
- Interaction depends on the level of access assigned to each message



IS360 Fall 2007 -
hongweif

Review of 'Innovatin mindfully'



Avg rating: -- based on 0 ratings

In the paper of 'Innovating mindfully with information technology', the author explores the mindfulness and mindlessness of organizations in information technology innovations. A typical example of mindless implementation of information technology innovation is ERP. I happened to discussed last week that Chinese companies pursue ERP like some kind of fashion with very few successes. Interestingly, this paper point out ERP is not a piece of cake for any company in any country. An initiative as big as ERP is crucial for an organization, it is astonishing to know that many organizations rush into it without a clear idea how it can benefit them. Maybe that explains the high failure rate. To tailor a big system like ERP for a particular organization need substantial work. Most of the work involved people and behavior change. To steer an organization from a reliable model of work to another involve many risks and resistance. Being mindful surely will help.

Another interesting thing about this paper is that it's very different with the papers we read before. It relies on concepts and charts, and uses very few quantitative data.

Posted by IS360 - hongweif / 2 comment(s)



IS360 Fall 2007 -
Charles Chong

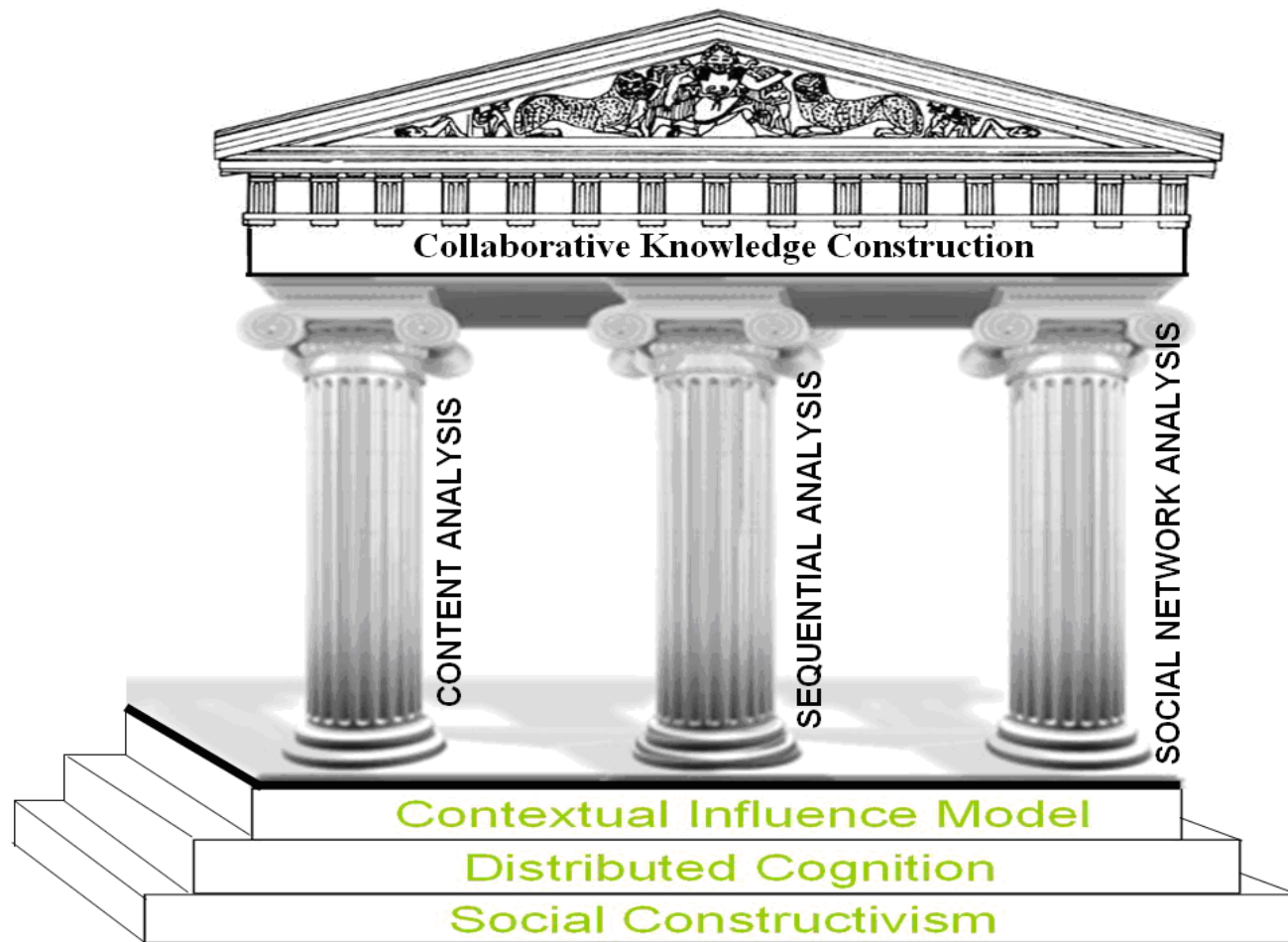
Mindfulness Research



Avg rating: -- based on 0 ratings

This article is an exploratory report intended to break new ground for the application of the mindfulness concept in IT, and to stimulate future studies in this topic. The article's main contribution is to lay the groundwork for further investigation in the cognitive processes organization. Well that is what the authors claim, and I am still scratching my head as to why

Three Pillars of the Study



Theoretical Perspectives and Methodologies (1)

- Social Constructivism:
 - Refers to an individual's making meaning of knowledge relative to social context (Pear et al., 2001)

- Content Analysis: Weinberger and Fischer (2005)
 - Epistemic Dimension:
 - On-Task: Construction of problem space, construction of conceptual space, and construction of relations between conceptual and problem space
 - Argument Dimension:
 - Micro-Level: Simple claim, qualified claim, grounded claim, grounded and qualified claim, and non-argumentative moves
 - Macro-Level: Argument, Counterargument, Integration(Reply), and Non-Argumentative Moves

Pear, J. and D. Crone-Todd (2002). "A social constructivist approach to computer-mediated instruction." *Computers & Education* 38(1-3): 221-231.

Weinberger, A. and F. Fischer (2006). "A framework to analyze argumentative knowledge construction in computer-supported collaborative learning." *Computers & Education* 46(1): 71-95

Theoretical Perspectives and Methodologies (2)

- **Distributed Cognition:**
 - Refers to new cognitions originating during interactions of the participants (Strijbos et al., 2001)

- **Sequential Analysis: Discussion Analysis Tool (Jeong, 2003)**
 - **Offers Two Metrics**
 - **Transitional Probability:** Based on the frequency of a particular response posted as a reply to a specific message type
 - **Mean Response Scores:** Determines how many times a given type of message is able to elicit a particular type of response

Strijbos, J. and R. Martens (2001). Group-based learning: Dynamic interaction in groups. EURO-CSCL Conference 2001, March 22-24, Maastricht, The Netherlands

Jeong, A. (2005). A guide to analyzing message-response sequences and group interaction patterns in computer-mediated communication. Distance Education 26(3): 367-384.

Theoretical Perspectives and Methodologies (3)

- Contextual Influence Model:
 - Points out that positive interdependence of distributed competencies (cognitive, social, and motivational) creates a shared responsibility (Hatch et al., 1993)
 - Each individual participates and will be affected differently through interaction (Strijbos et al., 2001)

- Social Network Analysis: UCINET Software (Wang et al., 2007)
 - In-Degree: The number of messages an individual receives from other group members
 - Out-Degree: The number of messages an individual sends to others in a social system
 - Density: An indication of the overall linkage of participants in a network

Hatch, T. & Gardner, H. (1993). Finding cognition in the classroom: an expanded view of human intelligence. In Salomon G. (Ed.). *Distributed cognitions* (pp. 164-187). New York: Cambridge University Press

Strijbos, J. and R. Martens (2001). Group-based learning: Dynamic interaction in groups. EURO-CSCL Conference 2001, March 22-24, Maastricht, The Netherlands

Wang, Y. and X. Li (2007). Social network analysis of interaction in online learning communities. Seventh IEEE International Conference on Advanced Learning Technologies.

Research Questions and Hypotheses

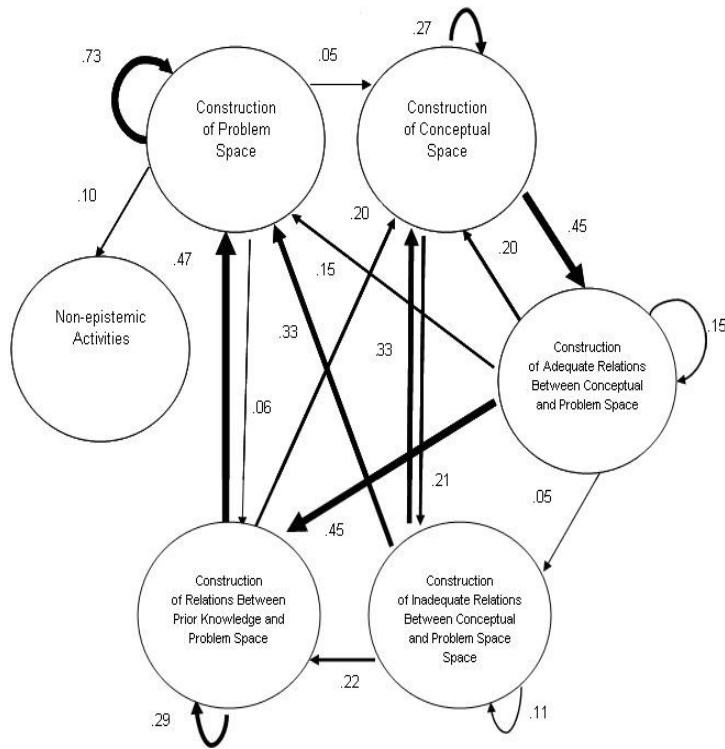
1. How will two systems affect the quality of discussions for collaborative knowledge construction?
 - H1: Anchoring discussion will foster theory-oriented discourse with greater emphasis on grounded claims
1. How will patterns of interaction relate to collaborative knowledge construction processes between the two systems?
 - H2: Anchoring discussion will produce higher mean number of responses emphasizing logical connections between theoretical principles and hypotheses
1. How will two systems affect the social network structure of a small group of doctoral students learning to conduct academic research and report it effectively?
 - H3a: The anchored discussion system group will have a higher number of messages between peers than the stakeholder system
 - H3b: The anchored discussion system group will have stronger overall network connection than the stakeholder system group

Key Findings-Content Analysis

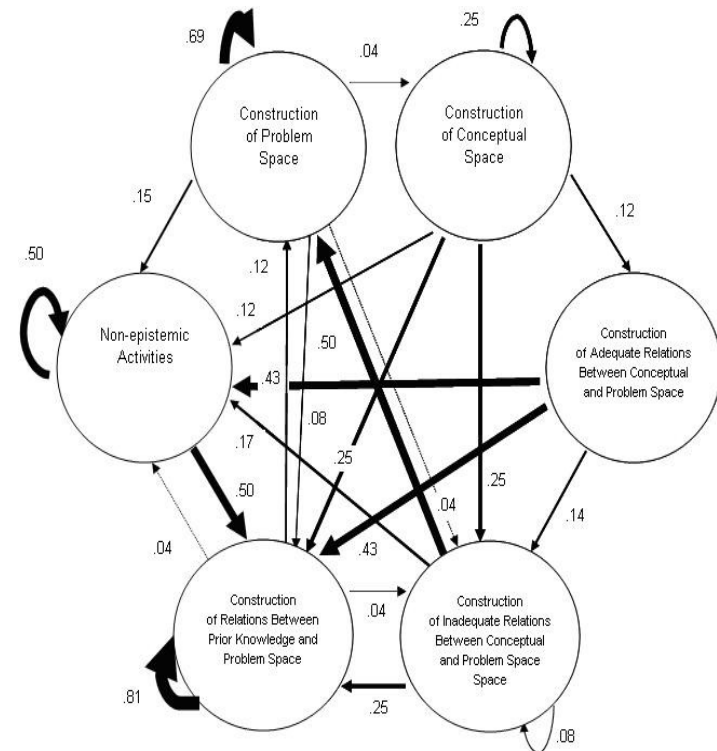
	Anchored Discussion System Group		Stakeholder-Controlled Networking System Group	
	Number	Percentage	Number	Percentage
<i>Categories of Epistemic Dimension of Argumentative Knowledge Construction</i>				
Construction of problem space	173	40%	70	43%
Construction of conceptual space	95	22%	11	7%
Construction of adequate relations between conceptual and problem space	62	14%	9	6%
Construction of inadequate relations between conceptual and problem space	30	7%	13	8%
Construction of relations between prior knowledge and problem space	57	13%	48	29%
Non-epistemic activities	20	5%	12	7%
<i>Categories of Micro-level of Formal Dimension of Argumentative Knowledge Construction</i>				
Simple Claim	195	45%	67	41%
Qualified Claim	64	15%	42	26%
Grounded Claim	108	25%	9	6%
Grounded and Qualified Claim	50	11%	33	20%
Non-argumentative Moves	20	5%	12	7%
<i>Categories of Macro-level of Formal Dimension of Argumentative Knowledge Construction</i>				
Argument	143	33%	80	49%
Counterargument	81	19%	14	9%
Integration (Reply)	193	44%	57	35%
Non-argumentative Moves	20	5%	12	7%
Total	437	100%	163	100%

Key Findings-Sequential Analysis

■ Anchored Discussion System Group



■ Stakeholder Controlled Networking System Group



Key Findings-Social Network Analysis

Measure	Anchored Discussion System Group		Stakeholder Controlled Networking System Group	
In-degree Centrality	Mean	35.86	Mean	10.71
	SD	12.86	SD	3.77
Out-degree Centrality	Mean	35.86	Mean	10.71
	SD	16.30	SD	4.2
Network Density	Mean	0.98	Mean	0.85
	SD	0.07	SD	0.09

Conclusion.

Three Themes Emerged From the Discourse

- Theme 1: Content Analysis Data
 - Anchored Discussion System: More grounded claims and greater emphasis on creating interpretations of theoretical principles
 - Stakeholder System: More complete arguments with grounds and qualifiers. But directed more towards construction of relations between prior knowledge and problem space

Conclusion..

- Theme 2: Sequential Analysis Data
 - Anchored Discussion System: More opportunity to take up contributions reflecting understanding of theoretical principles and further them by articulating how those principles lead to formulation of testable hypotheses in a research paper
 - Stakeholder System: Messages on construction of conceptual space more likely to be followed by a response on construction of conceptual space, construction of inadequate relations between conceptual and problem space, or construction of relations between prior knowledge and problem space

Conclusion...

- Theme 3: Social Network Analysis Data
 - Anchored Discussion System: Higher but more heterogeneous participation in discourse. Also, stronger overall network connection
 - Stakeholder System: Less but more homogeneous discourse participation
- Anchored Discussion System -> Theory oriented collaborative processing of research papers
- Stakeholder System -> Personal oriented processing of research papers

Thank You for Your Time



Your Comments and Questions are
welcomed.

Please address feedback to:
evren.eryilmaz@cgu.edu