

CITE Seminar

Group development
and leader's role
in CSCL

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Background

- CSCL: Computer-supported collaborative learning
- With the help of information & communication technology (ICT), a shared networked space is created for students to share information, discuss, exchange & build-on ideas, & construct knowledge together

Background

- Group as the unit for students to participate in CSCL activities



(MFS) 4C Physics

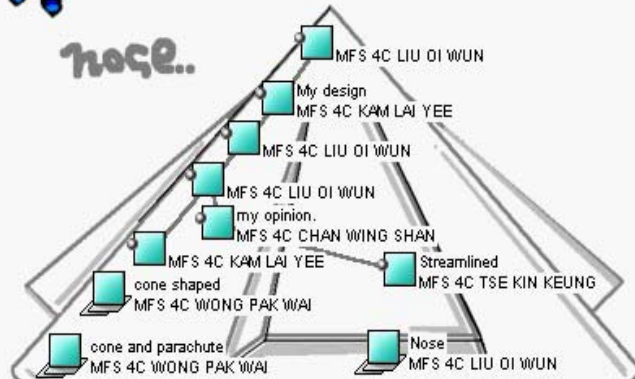


FLY Up Stay High

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Material of parachute
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Background

- What happens if they don't work in groups?
 - An international collaboration between HK and Canada students
 - Total 45 students
 - Before forming groups, they introduced themselves with one another
 - After one week.....



Background

- Group is often used as an implementation unit in CSCL
- But “group” itself does not receive much research attention
- Nor theoretical attention

Theoretical rationale of CSCL

- Social theories of learning
 - Relationship between social interaction & learning
- Piaget (1928)
 - Socio-cognitive conflicts
- Vygotsky (1978)
 - Zone of Proximal Development (ZPD)
- Both focus on inter-personal level

Theoretical rationale of CSCL

- Recent theories more macroscopic
- Distributed cognition (e.g., Salomon, 1993)
 - Knowledge distributed among individuals, environment, & cultural artifacts
- Community of practice (Lave & Wenger, 1991)
 - Learning is to become a participant in a community; knowledge is an aspect of practice, discourse, & activity

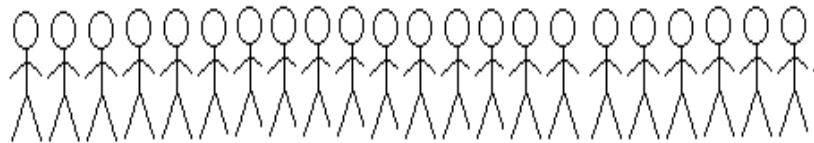
Theoretical rationale of CSCL

- Knowledge building (Bereiter, 2002)
 - Popper (1972)'s three worlds
 - World 1: Physical objects
 - World 2: Individual's beliefs & mental states
 - World 3: Ideas & artifacts created by humans
 - Differentiate learning (World 2) & knowledge building (World 3)
 - Education should focus more on KB, in which learning is necessitated and integral to it

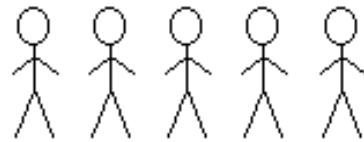
Theoretical rationale of CSCL

- In KB, knowledge as conceptual artifacts that can be modified
- Knowledge building community (Scardamalia, 2002)
 - 12 KB principles
 - Collective responsibility for the advancement of knowledge

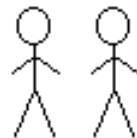
Theoretical rationale of CSCL



Community



Group



Inter-personal

More recently

- Stahl (in press):
 - Group as the primary unit that mediates between individual & community learning
 - Can CSCL groups think?

Why study groups?

- Why some CSCCL groups perform better than others?
- Do CSCCL groups change/develop over time?
- What kinds of social dynamics occur within the group?
- What factors affect the development of CSCCL groups? (e.g., leadership)
- Need a better conception of “group development”
- Literature of social psychology

Group development

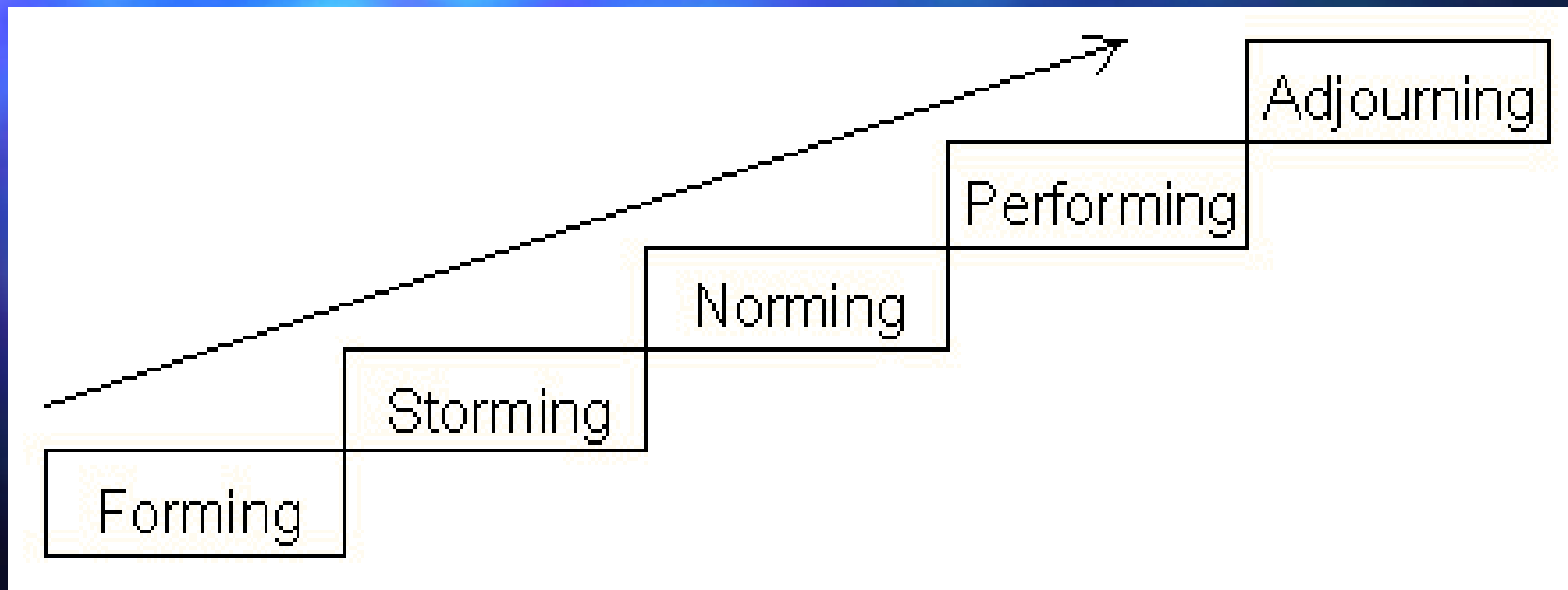
- Although different researchers were interested in different kinds of group, some general patterns could be found
- Three major types of model describing the development of group
 - 1) Sequential stage models
 - 2) Task-cycle models
 - 3) Punctuated equilibrium model

Sequential stage models

- Development as stage-like
- From beginning to end
- Each stage is distinct from one another on aspects such as members' relationships, commitments to the group
- Most cited one:
 - Tuckman & Jenson (1977)'s 5-stage model

Sequential stage models

- Based on an extensive review of earlier group development literature



Task-cycle models

- Sequence in completing a group task
- Bales & Strodtbeck (1951) observed the decision-making process in laboratory groups that met for one session
- 3-phase
 - Orientation (Gather information & clarify the task)
 - Evaluation (Assess the information)
 - Control (Decide action)

Task-cycle models

- Later works found that groups did not necessarily go through a fixed phase sequence (e.g., Poole & Roth, 1989)
- Problem-solving sequence depended on nature of task, e.g., phase of planning
- Multiple tasks and sub-tasks

Task-cycle models

- Tschan (2002)
 - Laboratory groups complete a design task involving different sub-tasks
 - Record the discourse
 - High-quality cycle: Complete cycle of orientation, planning, & evaluation
 - Performance positively related to the proportions of high-quality cycles in the group's total discourse

Punctuated equilibrium model (PEM)

- Critical or sudden event
- Punctuated equilibrium
 - A concept in biological evolution
 - From fossil records, living organisms remained approximately the same for a long time, then suddenly, some organisms extinct and new organisms appeared; such equilibrium lasted for a long time until another sudden change

Punctuated equilibrium model (PEM)

- Gersick (1988, 1989) observed project groups in both organizations & laboratories and found similar pattern
- Development in two phases
- 1st phase: with little progress, until the transition point, when they noticed deadline was coming
- 2nd phase: develop rapidly to complete the task

Punctuated equilibrium model (PEM)

- The shift (from 1st to 2nd phase) could be done in two ways
 - 1) Summarize previous work, declare it as completed, pick up next task
 - 2) Simply drop the old approaches in phase 1, reach out for new ones to complete the task
- The second way appeared more

Conceptual framework

- How to integrate the above models (sequential stage, task-cycle, & PEM) to better conceptualize group development?
- A conceptual framework is chosen
- Complex Action System Theory (CAST) (McGrath & Tschan, 2004)

Framework of CAST

- Definition

- Groups as complex, adaptive, and dynamic systems, which are open and interdependent with both the smaller systems within them, such as individual members, and the larger systems they are embedded, such as organizations and communities

Framework of CAST

- Group composed of 3 kinds of element
 - 1) People
 - 2) Intentions: Tasks and subtasks
 - 3) Resources: Technologies and tools

Framework of CAST

- Throughout a group's life, 3 levels of dynamics are interacting
- 1) Local dynamics
 - What a group actually does
 - Operational processes
 - Task cycles

Framework of CAST

- 2) Global dynamics
 - Emerged from local dynamics
 - Group-level phenomenon, e.g., level of conflict, cohesiveness of the group
 - Developmental processes
 - Represented by the group-level or global variables waxed and waned at different times

Framework of CAST

- 3) Contextual dynamics
 - As a group is embedded in larger systems, there are contextual variables affecting its development
 - But the group can adapt
 - Interplay between contextual variables & group's adaptive processes

Integration

- Local dynamics tapped with task-cycle models
- Contextual dynamics with punctuated equilibrium model (critical event)
- Global dynamics: overall development
 - Patterns of global variables
 - Not necessarily stage-like

CSCCL literature

- With CAST as the framework to conceptualize group development, how could previous CSCCL studies be fitted in?
- In the literature of CSCCL, there were studies focused on the detailed sequence in completing a task, there were also studies looked at overall development
- Look for the potential indicators that could act as global variables to describe the developmental process of CSCCL groups

CSCCL: Detailed sequence

- Jonassen & Kwan (2001)
 - Compared the performance of face-to-face (FTF) & computer-mediated communication (CMC) groups on solving both well-structured & ill-structured problems
 - Each communication act was classified as problem definition, orientation, solution development, non-task, simple agreement, or simple disagreement

CSCL: Detailed sequence

Table 6 □ Group A's Problem-solving Sequences for the Four Group Problem-solving Activities

Case 1 (CW)	PA-OO-PC-PA-CD-SD-OO-SA-CD-SD-SC-SD-SC-OO-PC-PA-SD-SA-SC-SA-SD-OO-SC-SD-SA-NN
Case 2 (FW)	PA-PC-CD-NN-PA-PC-OO-PA-NN-OO-PA-PC-SD-SC-SD-SC-SA-NN
Case 3 (FI)	PA-NN-PC-NN-PA-PC-PA-CD-SD-SA-NN-SD-CD-OO-SC-SD-SC-SA-SC-SA
Case 4 (CI)	OO-NN-PA-PC-SD-OO-CD-SC-SD-OO-PC-PA-PC-OO-SC-SD-NN-OO-CD-SD-SC-PC-PA-SD-SA-PC-SC-SD-SC-OO-PC-SA-SC-SD-SA

CW = Computer-conference, Well-structured problem

FW = F2F, Well-structured problem

FI = F2F, Ill-structured problem

CI = Computer conference, Ill-structured problem

PA = Problem analysis

OO = Orientation

SD = Solution Development

SC = Solution critique

PC = Problem critique

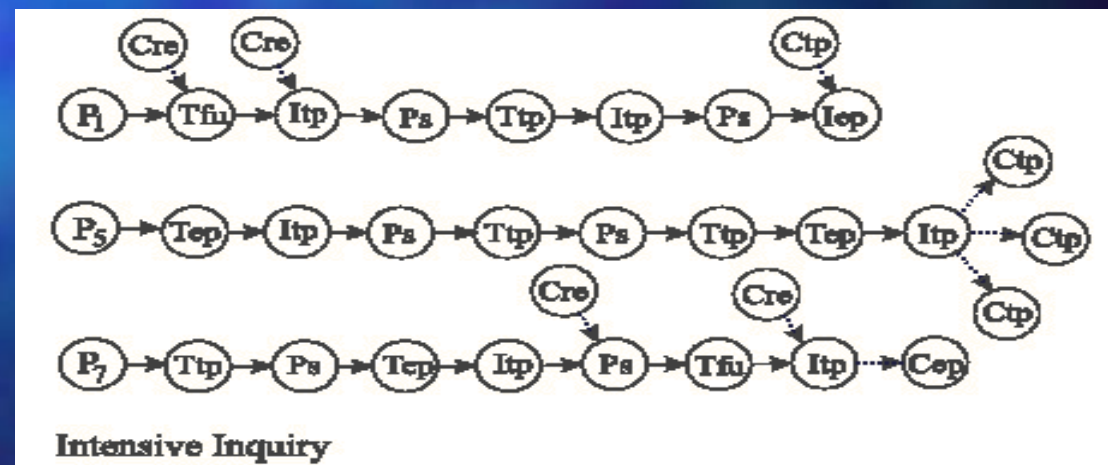
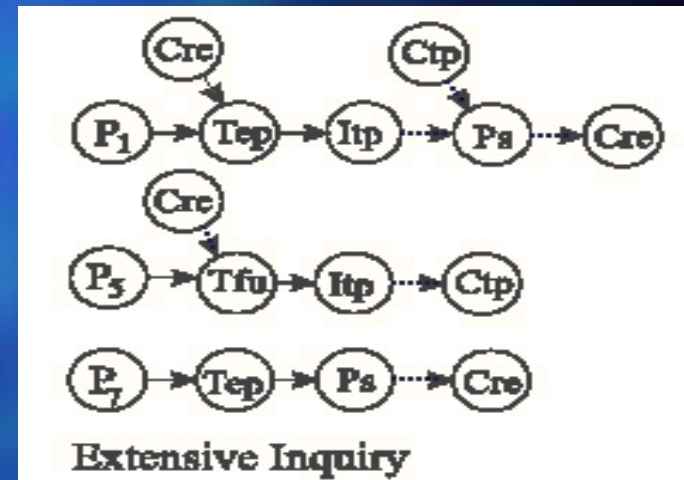
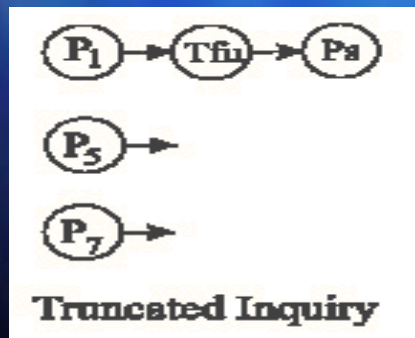
CD = Criteria development

SA = Solution approval

NT = Nontask

CSCCL: Detailed sequence

- Hakkarainen (2004)
- Progressive inquiry: sustained processes of advancing & building of knowledge



CSCCL: Overall development

- Two meanings of development
- 1) Level of depth
 - From low level to high level
 - Depends on the instrument
- 2) Time
 - From early stage to final stage
 - Divide the range of time into phases

CSCCL: Development (by level)

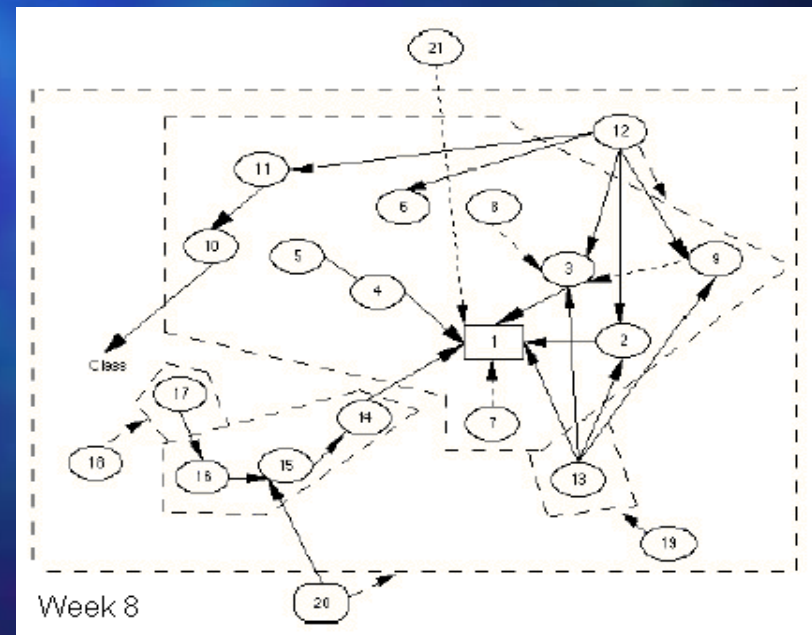
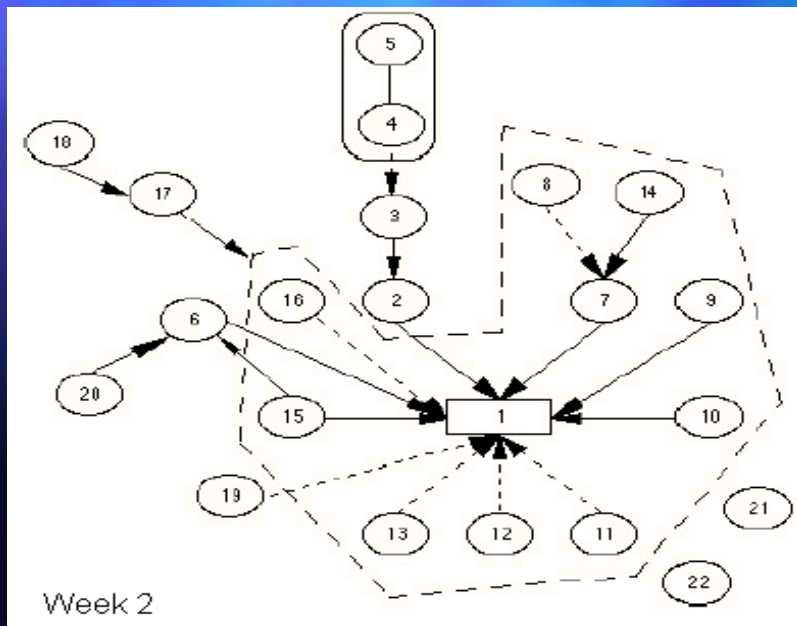
- Gunawardena et al. (1997)
 - 1) Sharing & comparing information
 - 2) Discovery of dissonance of ideas
 - 3) Negotiation of meaning
 - 4) Testing & modification
 - 5) Agreement statement
- An online debate forum
- Analyzed final postings, most within phases 1 & 2

CSCCL: Development (by level)

- Lipponen (2000)
 - Based on Knowledge building
 - Identified 3 types of discourse (Fact-, Explanation-, & Social-oriented)
 - Explanations are more advanced than Facts
 - Fact-oriented discourse slightly more dominant
 - Importance of teacher

CSCCL: Development (by time)

- Hara et al (2000)
 - Interaction pattern: from “starter-centered” to “synergistic”



CSCCL: Development (by time)

- De Laat & Lally (2004)
 - 7 students & a tutor
 - Beginning, middle, & end phases
 - Tutoring process (monitor progress)

Tutoring process			
	Beginning	Middle	End
<i>Direct instruction</i>	4	2	1
<i>Facilitation</i>	25	54	29
<i>Instructional design</i>	31	16	15
<i>Total</i>	60	72	45

Tutor only			
	Beginning	Middle	End
<i>Direct instruction</i>	2	0	1
<i>Facilitation</i>	8	2	9
<i>Instructional design</i>	8	3	8

CSCCL: Development (by time)

- Law & Wong (2003)
 - A rubric based on 12 KB principles and measured at group level
 - Applied to 43 groups of 250 secondary students working on an online discussion forum, Knowledge Forum (KF)

CSCCL: Development (by time)

- Some KB principles emerged in earlier stages
 - Democratizing knowledge
 - 知識面前, 平等參建
 - Idea diversity
 - 多元觀點, 正反並現
 - Community knowledge, collective responsibility
 - 共同承擔, 知識無限

CSCCL: Development (by time)

- Some KB principles emerged later
 - Epistemic agency
 - 追求知識, 自主自力
 - Knowledge building discourse
 - 討論交流, 建構為優
 - Improvable ideas
 - 不斷鑽研, 完善觀點

CSCCL: Development (by time)

- Some were more difficult to emerge
 - Rise above
 - 融會總結, 昇華超越
 - Real ideas, authentic problems
 - 討論投入, 聯繫現實
- Some did not emerge at all
 - Symmetric knowledge advancement
 - 跨組參詳, 並行成長
 - Pervasive knowledge building
 - 知識建構, 無處不透

CSCCL: Development (by time)

- Some depended on previous experience & teacher's facilitation
 - Constructive use of authoritative sources
 - 善用權威, 助己發揮
 - Embedded & transformative assessment
 - 時刻反思, 改進認知

CSCCL: Facilitator's role

- Lipponen (2000)
 - Teacher is an important factor in advancing student's discourse from fact- to explanation-oriented
- Muukkonen et al (2004)
 - Less experienced tutor asked more content-related question;
 - More experienced tutors on giving advice for further advancing the inquiry

CSCCL: Facilitator's role

- Chen & Jiang (2004): 5 scaffolding strategies
 - Being a follower
 - Questioning
 - Affirming
 - Stirring up
 - Identifying the potential leader

Research framework of my study

- Study the development of CSCL groups
- Local dynamics
 - Sequence of problem-solving and inquiry
- Global dynamics
 - Variables that are useful in describing the developmental processes of CSCL groups
 - KB principles as the potential candidates
- Contextual dynamics
 - Teacher's facilitation, sharing of leadership, nature of task

Research questions

- What developmental patterns could be found in CSCL groups?
- Are they related to nature of task?
- How are they related to the task cycles in the local dynamics?
- Are there high-quality cycles and what are the consequences ?
- How could teachers facilitate the development?
- What roles played by student's leadership or shared leadership?

Method

- Source of data
- Learning Community Project (LCP)
 - More than 1000 HK students
 - Primary to Secondary
 - Different subjects and tasks
 - Use an online platform (KF) to discuss
- ICS students in Canada
 - Longitudinal data from P1 to P5

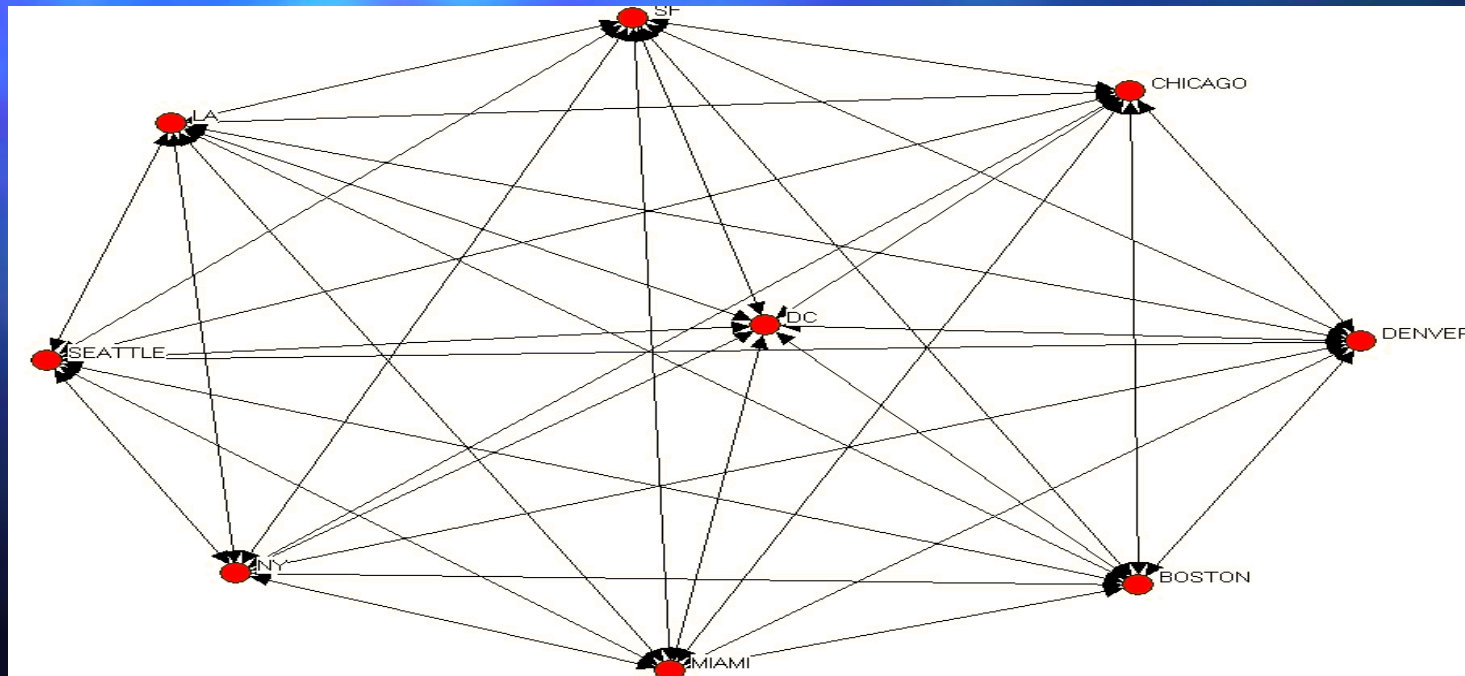
Method

- Quantitative analysis
- Analytic Toolkit for KF (ATK) indices
 - Participation: #notes created, read, edited

User Name	Saves			Reads		
	Total # Saves	Diff Notes	New Notes	Total # Reads	Diff Notes	New Notes
HKUGAPS Patrick	13	13	13	81	50	50
HKUGAPS Vivian	.	.	.	.	.	.
HKUGAPS Sam	.	.	.	.	.	.
ICS Richardm	94	35	35	287	78	78
ICS Richardr	23	20	20	107	77	77
ICS Jacquelinem	.	.	.	19	18	18
MEAN	21.7	11.3	11.3	82.3	37.2	37.2
SD	33.46	13.06	13.06	100.06	33.04	33.04
MEDIAN	6.5	6.5	6.5	50	34	34

Method

- Social Network Analysis (SNA)
 - Pattern of interaction



Method

- Qualitative analysis
- Online discourse
 - Global level: KB principles
 - Local level: Task cycle
 - Contextual level: Teacher's facilitation & task nature
- Student & teacher interview