

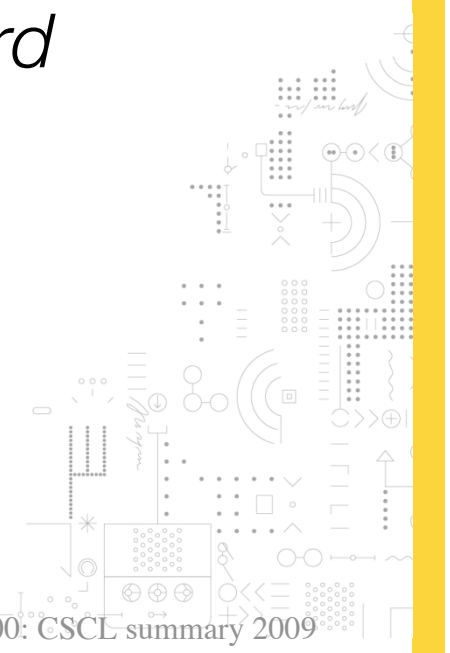


# Overview of subject matter and relationship of ideas

*Anders Mørch and Kathrine Nygård*

TOOL 5100

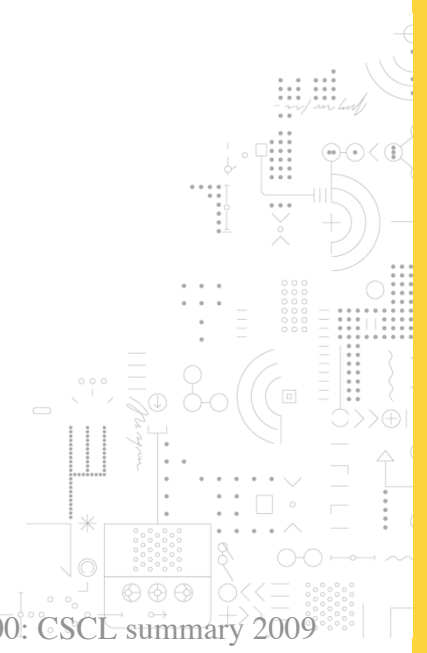
Summary of CSCL, 24.11.2009





# Overview

- Basic issue and concepts (theory)
- Technology to support
- Methodology
- Scaffolds for collaboration
- Empirical studies





# Disclaimer

- 2-4 foils from each of the themes, slightly edited
- Tries to capture the important points, but strips off important context
- It requires the viewers to have read the presented articles and followed the lecture series, otherwise the points may not make sense



# Basic issue

- Basic issue: How to move from social interaction to individual learning
- How to account for collaborative learning, i.e.
  - Learning together, *or*
  - Social interaction and individual learning
- In any case, how to study the situations, with what methods
- And what tools to support it, and how to go about designing the tools



# Two concepts and techniques

- There is no easy path from social interaction to individual learning
- By starting from the “perspective of the other,” one learn to see other people in order to order to see oneself, i.e. to see oneself from the “eye of the other”
- It is a social concept for higher order thinking, like reflection, self-consciousness, and monitoring/critiquing
- ZPD provides techniques and stages to describe the process, ultimately leading to independent problem solving
- Independence will next lead to interdependence in new encounters with the social, to iterate the process



# Role-taking according to Mead

- “The principle which I have suggested as basic to human social organization is that of communication involving participation in the other.” (Mead, 1934, p. 253)
- Two sub processes:
  - Identify a new role and learn to observe it
  - Take on the role in order to apply self-criticism and adjustment to own behaviors
  - Gestures and speech provide the data for observation, according to Mead



# Zone of proximal development

- ZPD is the “distance between the actual developmental level as determined by independent problem solving, and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers.” (Vygotsky, 1978, p. 86)
- ZPD has had an big influence on the development on *instructional scaffolding* (Wood et al., 1976)



# Role-taking and ZPD

- These two concepts have influenced (directly and indirectly) CSCW and CSCL, in terms of techniques for analysis and design
- Whereas they have have numerous *implications* for research in education and sociology, and extensively written about ...
- They are not often thought of as having *applications* to technology design
- You will learn more about it in this course



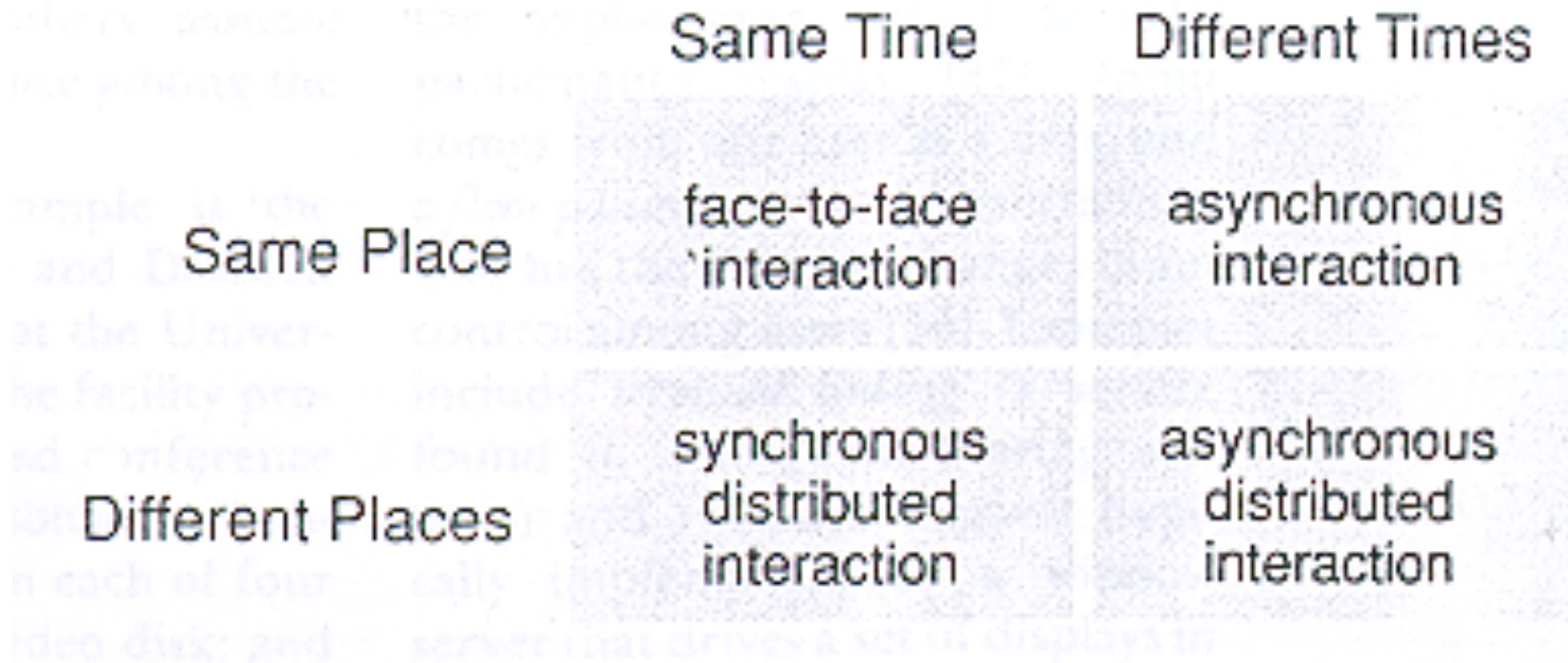


# Technology

- CSCW is a set of concerns about supporting multiple individuals working together with computer systems
- Groupware is associated with the “CS” part, is computer systems that support groups of people engaged in a *common task* (or goal) and that provide an *interface to a shared environment*
- There are also implications for organization.
- Communication, coordination, collaboration



# Time/place matrix





# From CSCW to CSCL

- One of the perspectives on CSCL we take in this course is to use groupware for educational purposes
- *What additional dimensions would be necessary or recommended to add to the time/place matrix in order to be able to better account for the factors that emerge in educational contexts (e.g. classrooms, work integrated learning)?*



# Groupware goes to school

- Stahl discusses collaboration technology and shows how one can extend a CSCW system (groupware) into educational technology
- Example: BSCW --> BSCL/Synergeia
- Identify characteristics of collaborative knowledge building
- Pedagogical models as requirements
- Knowledge building forum

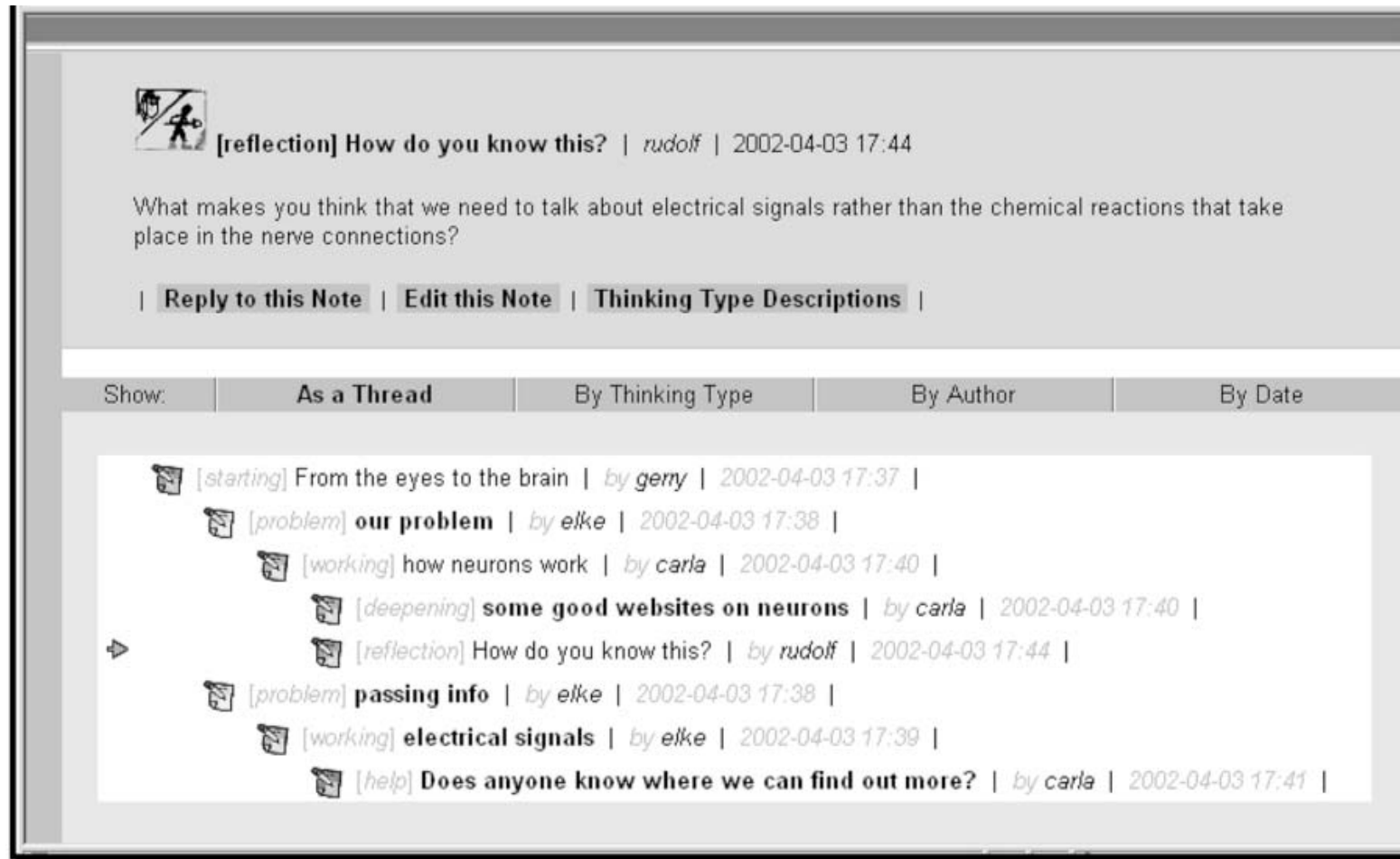




# Pedagogical requirements for Synergeia

- Collaborative knowledge building
- This is an educational approach that stresses the construction of knowledge by a group of learners, typically including students and teachers.

# Knowledge building forum UI



**Figure 3** The group knowledge building area. This area provides an overview of the discussion within a group and offers an interface for engaging in the knowledge building process.



# The computer's role in CSCL

- Tool for supporting mediation and learning
  - Active mediation
  - Learning as an appropriation of tools
- Shared work space (groupware for learning)
- Peer-to-peer (handheld devices for flexible communication)
- New collaboration environments (e.g. Web 2.0)
- Design of new features into existing tools and environments, like
  - Educational critics
  - Social awareness mechanisms





# The field of CSCL

- CSCL: Computer Supported Collaborative Learning
- A field concerned with *collaborative learning* and how it might be supported by computers
- The role of technology is seen as a “mediating artifact”, i.e. to support *interaction and learning in groups* becomes key concerns
- The role of CSCL in the field of ICT& learning can be compared to the role of language and talk in educational settings (a prerequisite rather than end)





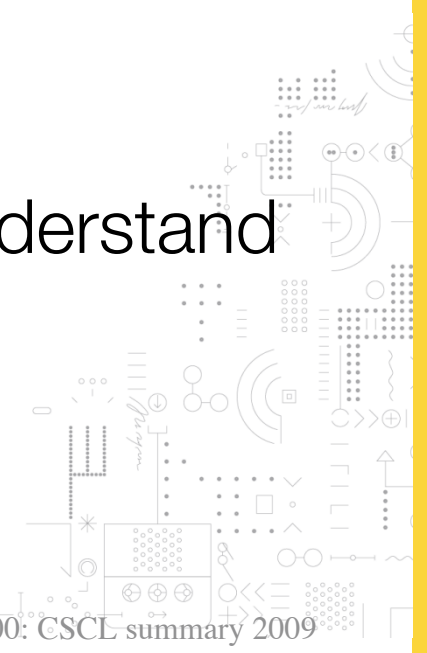
# Implications for education

- A goal of a collaborative learning task is to take part in a knowledge creation process that exceeds the sum of what the individuals can achieve on their own
- Stahl, Koschmann and Suthers put it this way:
  - “CSCL locates learning in meaning making and negotiation carried out in the social world rather than in the individuals’ heads”.
- Learning in groups and learning through virtual collaboration (distance education)
- CSCL researchers do not negate individual learning, but leave that for others, and focus instead on those situations that encourages learning in groups



# Basic approaches to CSCL

- According to Ludvigsen and Mørch (2007):
- Systemic approach
  - Cognitive science perspective
- Dialogical approach
  - Socio-cultural perspective
- Both approaches are important to understand and design for CSCL





# Systemic approach

- The systemic approach gives useful guidelines for how we can build support for cognitive processes of importance to collaboration like hypothesis generation, data interpretation, and scientific explanation.
- However, this model-based approach to learning and cognition needs to be supplemented by a situated approach from a social and cultural perspective to provide a full account of CSCL



# Dialogical approach

- The dialogical approach to CSCL provides new analytic concepts to analyze how students and teachers interact in collaborative learning. The dialogic approach gives broader insights and explanations concerning the development of traditional skills, and pays particular attention to skills such as those for communication, coordination, information sharing, collaboration, negotiation, critiquing, and decision-making, and how to design CSCL tools to support these activities



# Research in CSCL

- Research in CSCL tend to favors understanding and supporting the *process* of learning rather than the *outcome*
- Key processes: internalization, externalization, trajectories
- Methodologically informed by design experiments
- Unit of analysis is complex and positioned on an axis between the individual and the social
- Time scale of research varies from a few seconds to a school year, depending on methodology and theoretical perspectives



# Design experiments

- Design experiment:
  - conducting rigorous and reflective inquiry, testing and refining innovative learning environments, and
  - defining new design principles based on previous research
  - Intervention
- Review of the literature in this area
- En empirical example
- Computer-based 3D simulation environment for exploring and learning the basics of protein synthesis (genetic engineering)



# Conclusions of study

- The analysis should go beyond improving the CSCLE environment in it self
- Studying how historical aspects are played out *in situ* will contribute to design experiments as more useful and productive tools in educational change
- Creating more advanced social designs to analyse the full meaning potential of the mediating tools



# Instructional scaffolding

- “To enable a child or novice to solve a problem, carry out a task or achieve a goal that would be beyond his unaided performance”
- “*Scaffolding* is accomplished by an adult or more capable peer controlling those elements of the task that are initially beyond the learner’s capacity”
- It acts like individualized feedback from the environment, supporting the learner to progress





# Types of feedback by tutor in experiment

- Showing
  - Direct intervention (giving example)
- Telling
  - A verbal error prompt (correction, critiquing)
  - Verbal attempt to make child to make more constructions (direction and reminder)



# The scaffolding process

- Recruitment (engagement, motivation)
- Reduction in degrees of freedom
- Direction maintenance
- Marking critical features (identify ZPD)
- Frustration control
- Demonstration (showing)



# Types of educational technology

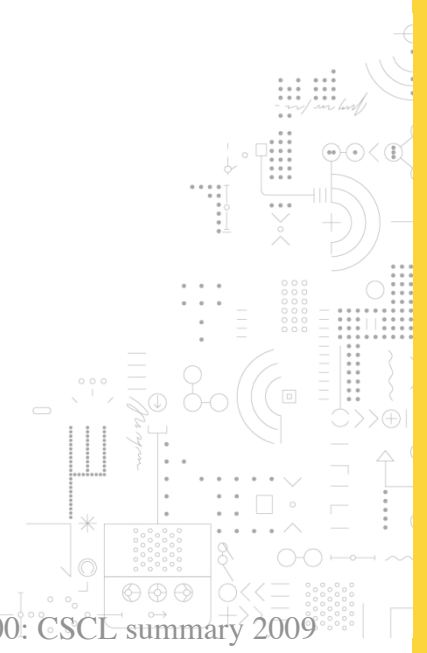
TABLE 1.1  
*Some Paradigms of Research in Instructional Technology*

	<i>Event Marking Emergence of Paradigm</i>	<i>Theory of Learning</i>	<i>Model of Instruction</i>	<i>Research Issue</i>	<i>Paradigmatic Studies</i>
CAI	Introduction of Coursewriter I (1960)	behaviorist	programmed instruction/instructional design	instructional efficacy	Coulson et al., 1962; Gilman, 1967; Merrill et al., 1980; More & Ralph, 1992; Riding & Chambers, 1992
ITS	Carbonell's dissertation (1970)	Information Processing Theory	one-on-one tutorial, interactive	instructional competence	VanLehn, 1982; Clancey, 1983; Woolf & McDonald, 1984; Koedinger & Anderson, 1990
Logo-as-Latin	Publication of <i>Mindstorms</i> (1980)	cognitive constructivist	discovery-based learning	instructional transfer	Clements & Gulla, 1984; Lehrer & Littlefield, 1993; DeCorte et al., 1992; Verzoni & Swan, 1995
CSCL	NATO Workshop (1989)	socially oriented theories of learning	collaborative learning	instruction as enacted practice	Roschelle (ch. 9, this vol.); Glenn et al., 1995; Griffin, Belyaeva, & Soldatova, 1992; Roth (in press)



# What is inquiry and inquiry learning

- Inquiry
- Inquiry learning
- Scaffolding inquiry learning





# Research questions in viten.no study

- What opportunities for action are embedded within the web-based learning environment viten.no?
- How do these opportunities for action become structuring devices,
  - In prompting situations?
  - In non-prompting situations?



# Findings from the study

- Prompting situations makes sometimes students adopt a copy-paste strategy
- In non-prompting situation students are more inclined to interact with others and reflect on the scientific knowledge
- Implications for design
  - Formulation of prompts
  - Role of teachers in classroom





# Inquiry learning: a test bed for scaffolding

Choose the category of inquiry	
<input checked="" type="radio"/> <b>prob</b> Problem	<input type="radio"/> <b>work</b> My Working Theory
<input type="radio"/> <b>deep</b> Deepening Knowledge	<input type="radio"/> <b>com</b> Comment
<input type="radio"/> <b>meta</b> Meta-comment	<input type="radio"/> <b>sum</b> Summary
<input type="radio"/> <b>help</b> Help	

- Fle2 categories:
  - Problem
  - My working theory
  - Reliable knowledge
  - Uncertain knowledge

*Our specialization of  
“deepening knowledge”*




# Student Assistant Agent

Why do we need genetically modified food? 14:21 2003-12-03

[Who has read this note?](#)

We are going to discuss why we need GM food. What are the benefits and what are the downsides og GM foods?



**Genetikk - better food?**

[Genetically Modified Food - News](#)

Select    Next ▶

Down ▼

**Elev assistenten sier:**

gruppe8: You have posted less messages than the others. You must be aware to contribute if you want to keep the discussion alive.

gruppe8: There is 'My Explanation' note without any responses. You should read that note and try to respond to it with a 'comment' or a 'Scientific Explanation'.

**Discussion thread in FLE3**

Show notes as thread by knowledge type by person by date

▶ Show bodies of all notes

- **(problem)** Why do we need genetically modified food? / teacher / 2002-10-03
  - **(my\_expl)** We need GE food to end world hunger / hovseter1 / 2002-12-03
    - **(my\_expl)** We think GE food would end world hunger / hovseter1 / 2002-12-03
    - **(comment)** From where did you get this information? / sandgotna1 / 2002-12-03
    - **(sci\_expl)** From this scientific magazine.. / hovseter1 / 2002-12-03





# Role of agents in collab kn bld

- Gather statistical information from database
- “Watch over shoulder” in the KB discussion forum and provide advice to the participants
  - Encourage non-active students to be more active
  - Suggest what messages to reply to and who should be doing so
  - Suggest what category to choose for the next message to be posted
  - Suggest when messages do not follow the scientific method of knowledge building, etc.

# The Collaborative Management Cycle

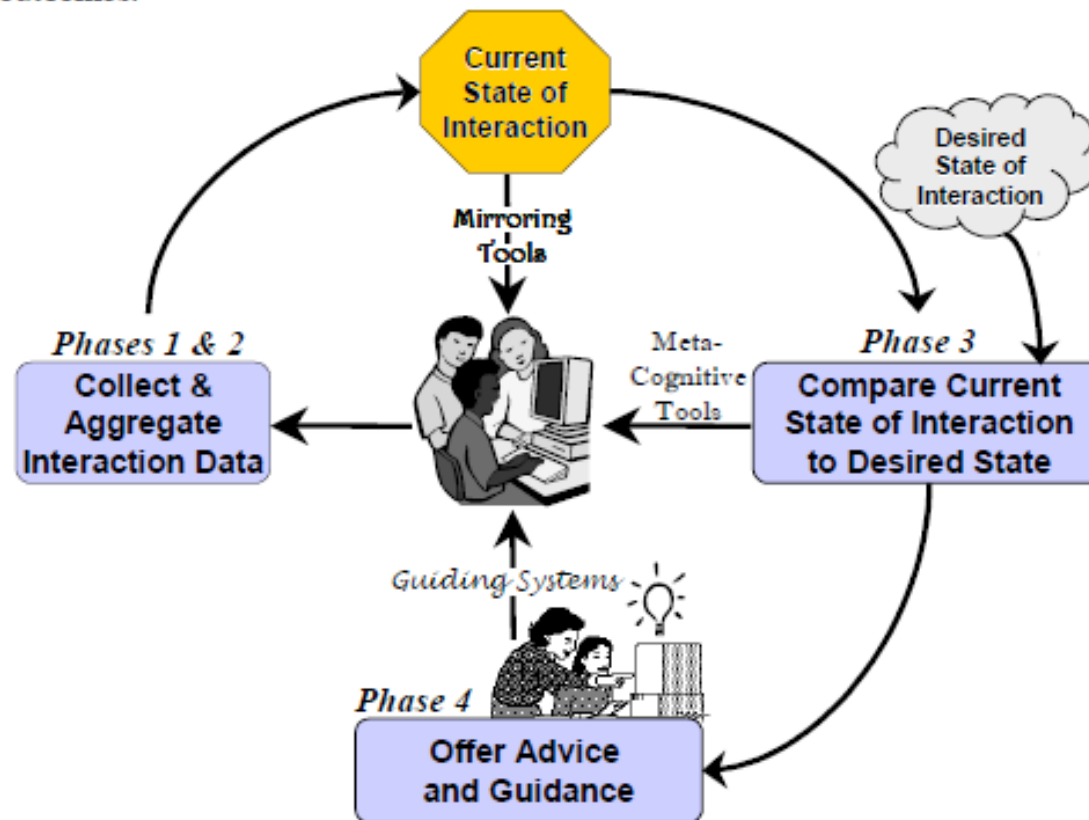


Figure 1. The Collaboration Management Cycle



# Distance education

- Two different papers that show examples for how to carry out studies in distance education:
  - Findings from Littleton & Whitlock papers: three kinds of characterization to group the findings (eliciting knowledge, responding to students' contribution, describing shared experience)
  - Findings from Smith (2005) paper: Early expectations, cyclical movement, and consequences of the cyclical movement)
- Compare method for data analysis employed in the two papers of this session. To what extent do they use previous work and/or theoretical frameworks to guide their analysis, or alternatively how do they go about categorizing data?



# Psychological experiments

- Group knowledge awareness, its implementation (not here) and evaluation (experiment)
- GKA tools affect focus from individual to collaborative learning, but not consistently used
- Patterns of male and female students participation in CSCL
- Females performed better when it came to engaging in inquiry rather than problem solving compared to boys

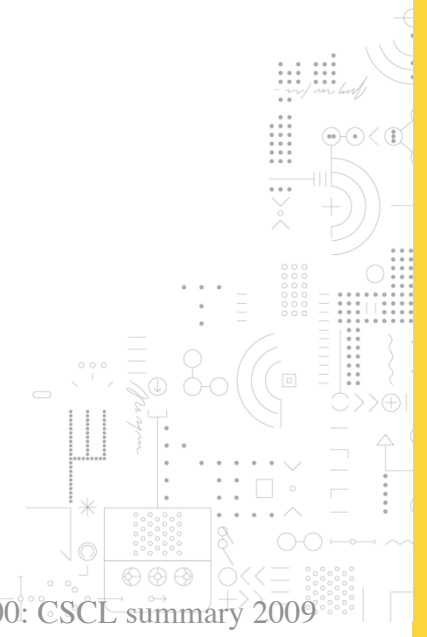




# Psychological experiments

Table 1. Frequencies of students' communicative ideas selected for analysis, classrooms A and B

Object of inquiry	Classroom A		Classroom B		Total	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Linguistic form	9	1.7	78	14.8	87	8.2
Problem+method	58	10.9	181	34.3	239	22.5
Information	167	31.4	228	43.2	395	37.3
Explanation	293	55.1	30	5.7	323	30.5
Unspecified	5	0.9	11	2.0	16	1.5
<b>Total</b>	<b>532</b>	<b>100.0</b>	<b>528</b>	<b>100.0</b>	<b>1060</b>	<b>100.0</b>





# Emerging trends in CSCL

- Coping with large amount of interacting peers
- High tech technology support
- How will it changing teaching and learning

