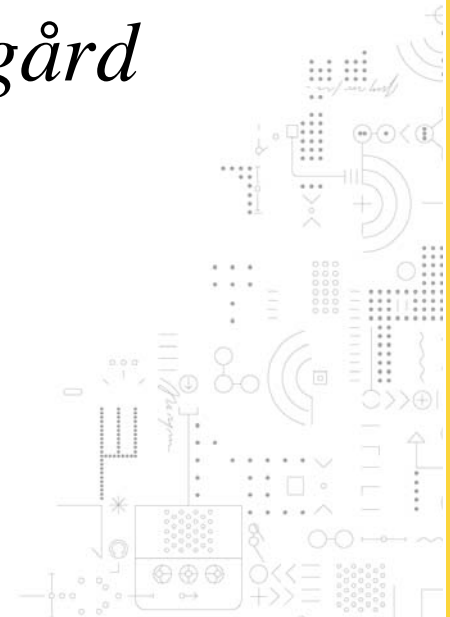


Computer Supported Collaborative Learning:

Introduction and overview of the rest of the course

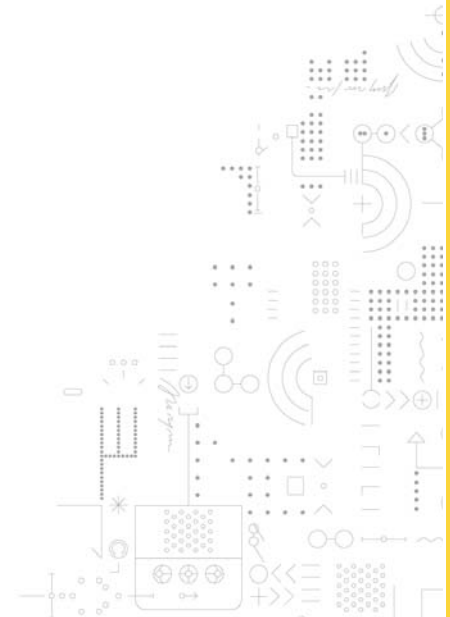
Anders Mørch and Kathrine Nygård

TOOL 5100



Outline

- What is CSCL
- Approaches and perspectives
- Basic concepts
- Related terms
 - Intersubjectivity, triological learning
- Methodological concerns
- The role of the computer



What is 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. *interaction* becomes a key concern
- The role of CSCL in the field computers and education (ICT& learning) can be compared to the role language has in conventional education (a prerequisite rather than an end)



Learning implications

- Stahl, Koschmann & Suthers put it this way:
 - “CSCL locates learning in meaning negotiation carried out in the social world rather than in the individuals’ heads”.



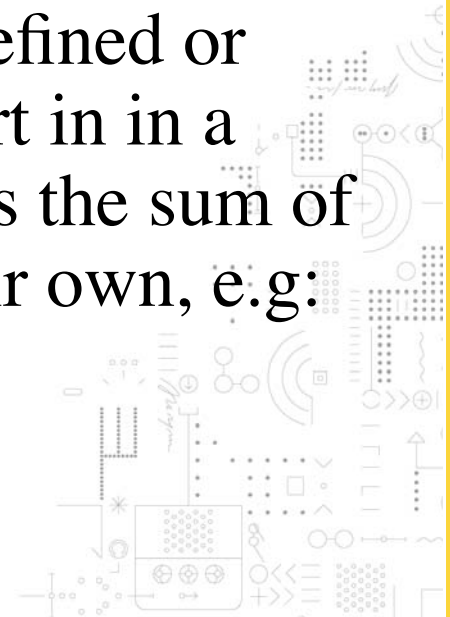
Design implications

- The computer is an information processing device (it is built as such)
 - CSCL has special requirements for design of tools and environments
- ICT is viewed as mediating artifact not unlike other tools we interact with in everyday activity
 - Concrete tools (chairs, pencils, screens)
 - Abstract tools (signs, symbols, ideas)
- CSCL tools typically support both aspects of a tool in the same device (concrete and abstract)



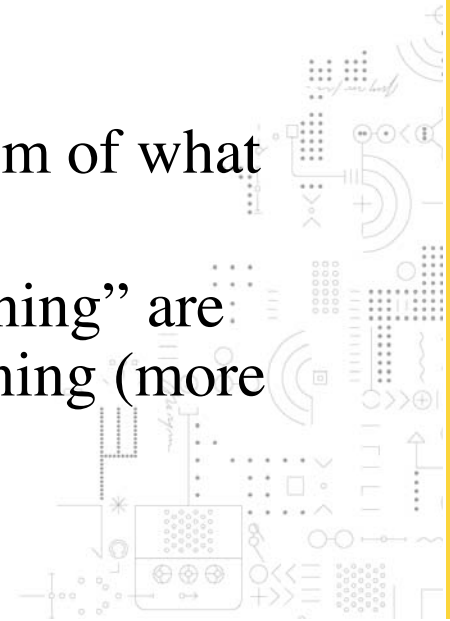
Collaborative learning

- Two settings: 1) learning in groups and learning through virtual collaboration (distance education)
- Involves two or more people
 - Usually two or more students, but can also be one teacher and several students
- The goal of a CL task is to reach a predefined or negotiated learning objective or take part in a knowledge creation process that exceeds the sum of what the individuals can achieve on their own, e.g.:
 - Group cognition (Stahl, 2006)
 - Intersubjective learning (Suthers, 2005)



Cooperative learning vs. collaborative learning

- Cooperative learning
 - Unit of analysis is the individual and learning is associated with individual learning, cooperation is necessary to solve joint tasks
- Collaborative learning
 - Unit of analysis is small group
 - Learning at this group level is more than sum of what the individuals learn
 - “Group meaning” and “intersubjective learning” are terms used to capture this inter-human learning (more on this in Theme 6)



Shortcomings of CL

- Collaborative learning have been criticized as having similar problems to those identified in problem-based learning and cased-based instruction (related pedagogical model where learners work in groups)
 - The problem of lurkers (free passengers)
 - The complexity of modeling real situations
 - Reaching closure and scaling up
 - Process becomes more important than outcome
- Many of these issues can be addressed by improvements to CSCL tools and environments



Factors affecting collaboration

- The nature of the collaborative task: e.g. physics problem solving vs. editing a school newspaper
- The nature of collaborators (peer, teacher-student, student-computer, etc.)
- The unit of analysis (individual, activity, group, classroom)
- The number of collaborators
- The previous relationship between collaborators
- The motivation of collaborators to engage in activity
- The setting of collaboration: classroom, workplace, home
- The time period of collaboration: from minutes to years



Approaches and perspectives in CSCL

- According to Ludvigsen and Mørch (2007) there is a key difference between:
 1. Systemic approach
 - Cognitive science perspective
 2. Dialogical approach
 - Socio-cultural perspective
- Both approaches are important to understand and design for CSCL



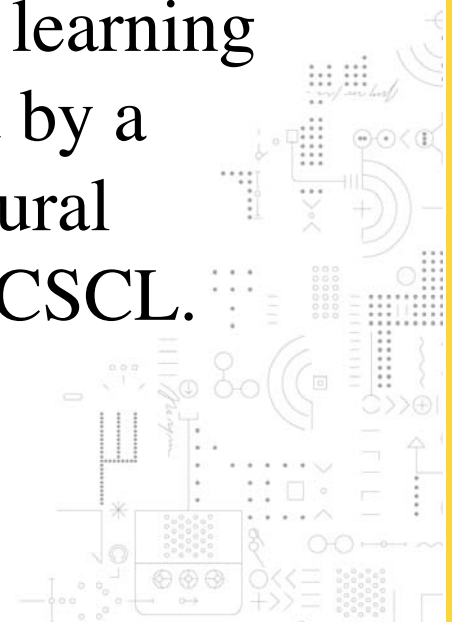
Systemic vs. Dialogical

- Systemic approach
 - Associated with the cognitive science, thought is monologue with one self (silent speech)
 - Thought can be modeled to high accuracy and the computer is well equipped for thus purpose
 - Key proponents: Simon and Newell; J.R. Anderson
- Dialogical approach
 - Mind embedded in a social context and mediated by a cultural collective
 - Key proponents: Engeström, Säljö, Wertsch



More on systemic approach

- The systemic approach gives useful guidelines for how we can build scaffolds for cognitive processes 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.



More on 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



Evolution of research in CSCL

- This paper, by Dillenbourg and colleagues, explain how research in CSCL has developed over time
- Their focus is on psychological concerns of collaborative learning and less on the role of computer as mediating artifact
- The computer is seen in the role of providing support of interaction analysis and modeling collaborative learning (we come back to these themes later in the course)



Key trends and characteristics

- CSCL focuses on supporting the *process* of learning rather than the *outcome*
- Key processes: internalization, externalization, trajectories (see Theme 4)
- Methodological informed by design experiments (see Theme 5)
- 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 perspective



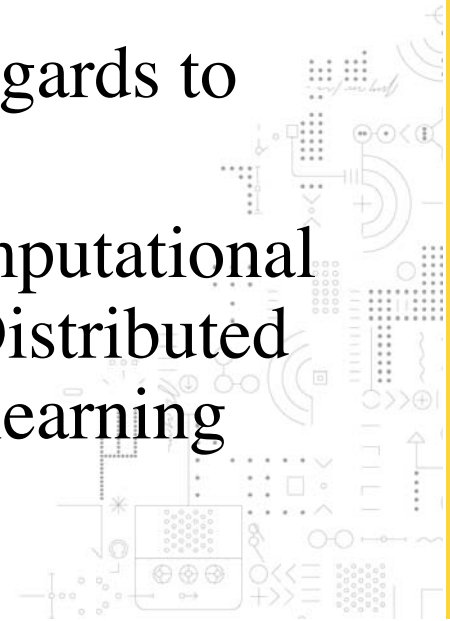
Key characteristics cont'd

- CSCL researchers need to know the following distinctions
 - Learning vs. problem solving
 - Collaboration vs. cooperation
- In many ways CSCL has moved:
 - From problem solving to learning (e.g. learning by joint problem solving)
 - From cooperation to collaboration
 - Priority on process rather than outcome
 - Joint interaction on common goal rather than strict division of labor into subtasks



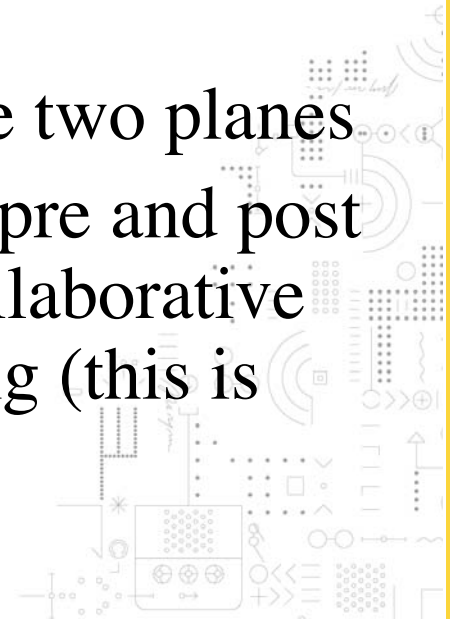
Theoretical positions

- Along an axis from individual to social the following theoretical positions (or perspectives) has been identified as prerequisite for CSCL:
 - Social constructivism
 - Sociocultural approaches (and activity theory)
 - Situated and shared cognition
- The two articles diverge slightly with regards to how they define the three perspectives
- Dillenbourg puts more emphasis on computational models and uses examples from DAI (Distributed AI) to propose models of collaborative learning



Social constructivism

- Also referred to as socio-cognitive approach
- Originated with Piaget and later extended to include social influences on individual development
- Unit of analysis is individual development in the context of social interaction, implying two planes: social and individual
- An issue becomes how to intertwine the two planes
- Experimentation is often conducted by pre and post tests, e.g, to assess the usefulness of collaborative learning compared to individual learning (this is critiqued in Stahl et al, 2006)



Sociocultural approach and activity theory

- Unit of analysis is ‘activity’: individuals acting together to achieve goals mediated by artifacts and rules to guide the activity
- Vygotsky’s ‘genetic law’ which says that inter-psychological (social) processes precedes intra-psychological (thought) processes is central to this perspective
- The role of mediating artifacts in these processes, from everyday physical tools and computers to abstract tools like language play important roles



Situated and shared cognition

- This is the most socially oriented of the three perspectives
- The environment is seen as an integrated part of the individual (cognitive) activity
- A focus is to identify the influence of the social plane
 - Situated cognition and situated learning (e.g. Suchman, Lave & Wenger)
 - Distributed cognition (e.g. Hutchins)
- This perspective in CSCL has been stimulated by apprenticeship learning (e.g. Lave, Rogoff)



Activities associated with CSCL

- Stahl, Koschmann and Suthers mention basic processes and practices
 - Information sharing (but beyond this)
 - Interaction
 - Negotiation
 - Joint meaning making (meaning can here mean many things)
 - Evolving common artifacts (like writing a paper together)



Early CSCL projects

- Three early projects that laid the ground for the emergence of CSCL:
 - ENFI (Gaullet U., USA)
 - CSCILE (Toronto U., Canada) (more on this initiative in Theme 2)
 - Fifth Dimension Project (UCSD, USA)
- Starting point: improving reading comprehension and writing (text production) for school children
- Transforming educational practice into personal meaning making and collaborative work



Multiple methodologies in CSCL

- Stahl et al mentions three :
 - Experimental
 - This is the most “cognitive” oriented perspective, making use of experimental methods of psychology
 - Descriptive
 - This is associated with interaction analysis and conversation analysis
 - Iterative design



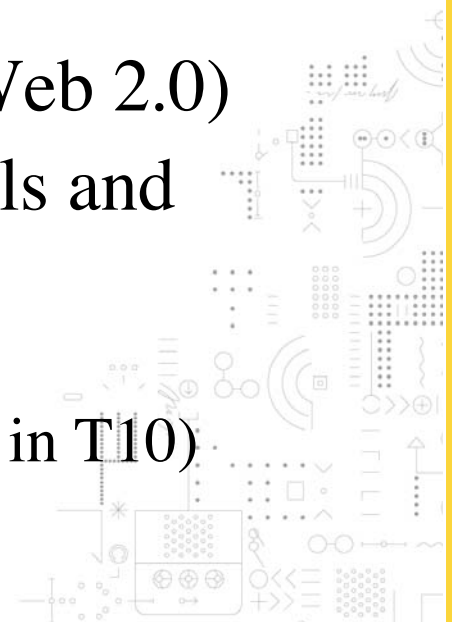
Iterative design

- Partnerships among researchers and educators with the goals of conducting rigorous and reflective inquiry in classrooms,
- Testing and refining innovative learning environments, and
- Defining new design principles based on previous research
- Repeating this process for improved results
- More about this is in Theme 5



The computer's role in CSCL

- Mediating artifact (ICT when seen from the point of view of social science)
- Shared work space (groupware for learning)
- Peer-to-peer (handheld devices for student interaction)
- New collaboration environments (e.g. Web 2.0)
- Design of new features into existing tools and environments, like
 - software critics (more on this in T7)
 - social awareness mechanisms More on this in T10)



From AI to collaboration support

- More on this in Themes 7 and 10
- Scaffolding
 - Subject domains
 - Scientific inquiry
 - Presence of others
 - Principles of virtual collaboration
- Levels of feedback
 - Mirroring, meta-cognitive support, guidance (see T7)
- Intervention technique
 - Pro-active, re-active, passive

