Chapter 7: Social Cognition
Cognitive conflict is the key learning mechanism for constructing knowledge structures.

A learning environment allows the student to learn by trial and error, but needs to provide guidance.
Learning Theory → Pedagogical Model → Learning Technology

- Skinner: Behaviorism
- Piaget: Constructivism
- Vygotsky: Socio-cultural theory
- Mastery Learning
- Guided Discovery Learning
- eLearning
  - Intelligent tutoring systems
  - Simulations, microworlds
  - Modeling, problem solving

? ?
1. In a group includes students with different levels of knowledge:
   - The lower students will learn from the explanations provided the better students
   - The better students will learn from explaining the task to the lower students
   - None of them will learn well because the difference of levels
   - Both will learn to work in heterogeneous teams, which is socially important

2. If a group includes students having opposite opinions or conflicting knowledge, will collaborative learning be effective?
   - No, because there will be a negative team spirit
   - No, because the student with incorrect knowledge might convince the one who had the correct knowledge
   - Yes, because this will force them to argue with each other and to elicit their knowledge
   - Yes, because they will learn to collaborate in conflict situations

3. When forming groups of students, what is the best way of combining men and women:
   - Separating them because their differences might prevent them to focus on knowledge
   - Mixing them because differences of collaboration style might increase the group effectiveness
   - Mixing them because they will have to collaborate in mixed groups in their professional life

4. What is the primary role of computers in collaborative learning?
   - Communication tools (chat, forum,...) enable teamwork at distance
   - Collaboration software can be designed to influence collaboration
   - Internet provides students with the knowledge they don't have in the team
   - It is important that students learn to collaborate in teams distributed worldwide
Mastery learning

Socio-Cultural Theories

Individualisation

Collaboration

# kids > # computers (late 90’s)
1 + 1 > 2

Is learning in teams more effective than learning alone?
Question 1: Is Collaborative Learning Effective?

<table>
<thead>
<tr>
<th>Learning Gains</th>
<th>&gt;</th>
<th>=</th>
<th>&lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta-analyses: collaborative versus individual</td>
<td>&gt;</td>
<td>=</td>
<td>&lt;</td>
</tr>
<tr>
<td>Slavin, 1983.</td>
<td>26</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Johnson &amp; Johnson, 1989</td>
<td>829</td>
<td>645</td>
<td>109</td>
</tr>
</tbody>
</table>

Thanks to Fabrizio Butera

A decision maker could conclude that the probability that team learning is effective is high enough to use it.

A scientist would instead conclude that team learning is not effective per se, but depends on the conditions... see next slide.
Question 2: When is collaborative learning effective?

Factors:
- **Group** composition: number, level, gender, age, ...
- **Task** features: verbalizable, open, ...
- **Medium**: face-to-face, synchro/not, text/audio/video, ...
- **Context**: school/work

The effects of collaborative depends upon so many variables (plus their interaction effects) that it is impossible to predict that a given teamwork in a specific context will be effective.
Question 3: Which interactions make collaborative learning effective?

1. Elaborated explanations
2. Conflict resolution, Argumentation / Négociation
3. Mutual Regulation

Collaborative learning occurs when team members engage into the ‘productive interactions’ listed above. These interactions are summarized as “the effort” that team members engaged to reach and maintain a shared understanding of the task.
Collaborative learning occurs when team members engage into rich verbal interactions.

These interactions are summarized as “the effort” that team members engaged to reach and maintain a shared understanding of the task.
Question 4: Which **design** increases the probability that teams produce the **interactions** that make collaborative learning effective?
Conditions of coll. learning

Interactions

Effects

(proactive)  (reactive)
STRUCTURE  (self-) REGULATE
Example of domination in teamwork
Self-regulation Tools

Reflect Table

K. Bachour, F. Kaplan, W. Hokenmeier
Reflect
“When I noticed that my LEDs weren’t lit indicating my inactivity, I felt frustrated.”

“I sometimes refrained from speaking to avoid having a lot more lights than the others. This obliged me to listen to the others.”
Self-regulation Tools

T-Test: $t = 2.176$, $p = 0.036$

Khaled Bachour, Frédéric Kaplan, Jean-Baptiste Haué, Quentin Bonnard, Wolfgang Hokenmaier
Report

Individual Speaking Time

Individual Accusal

Group Speaking Time

Turn Takings

Table: Hidden Mode

Table: Territories Mode

13.05.2011

09:46 - 10:38

Flaviu Roman
Conditions of coll. learning → Interactions → Effects

(proactive) STRUCTURE

(reactive) REGULATE

SCRIPTS

Semi-Structured Interfaces
Belvedere Inquiry Diagram - We are deciding what killed dinosaurs and other species

Problem Statement: We are deciding what killed dinosaurs and other species

Groups: Studer

Belvedere (Suther et al.)
Semi-Structured Interfaces

Baker & Lund
Semi-Structured Interfaces

Task information and timer

Scripted discourse

Neue Analyse des Falls Asien - Ahorn, 29.1.2001 - 15:33:45

Erste Analyse des Falls Asien - Ahorn, 29.1.2001 - 14:29:22

Konstruktive Kritik - Birke, 29.1.2001 - 14:45:32

Antwort auf Kritik - Ahorn, 29.1.2001 - 14:51:58

Konstruktive Kritik - Birke, 29.1.2001 - 15:16:33

Antwort auf Kritik - Birke, 29.1.2001 - 14:37:07

Konstruktive Kritik - Pme, 29.1.2001 - 15:09:06

Learning environment orientation map

Fischer & Weinberger

Fall Asien

In einem Seminar erfahren Sie von einer Studie, in der festgestellt wurde, dass asiatische Kinder gegenüber amerikanischen und auch europäischen Kindern wesentlich bessere mathematische Leistungen erbringen. Interessanterweise zeigte sich auch, dass sich die asiatischen Kinder hinsichtlich ihrer Begabung kaum von den amerikanischen und europäischen Kindern unterschieden. In der Studie hat man dann sowohl die Schüler, als auch deren Eltern befragt, wie sie sich Erfolg und Misserfolg in naturwissenschaftlichen Schulfächern erklären. Dabei hat sich gezeigt, dass die asiatischen Eltern und Kinder vor allem günstigere Attributionsmuster im Hinblick auf die Dimensionen der Stabilität haben. Wie lassen sich die Leistungsunterschiede aus der Perspektive der Attributionstheorie erklären?
Multi Input Devices: the participation of each learner is “designed” because each mouse only access some screen functions
Multi Input Devices:
the participation of each learner is “designed” because each mouse only access some screen functions

M. Nussbaum, UC Chile
“Computer-supported collaborative learning” (CSCL)

1990-2000: Technologies **enable** collaboration

2000-2010: Technologies **shape** collaboration (design)
Pedagogical scenario for increasing the probability that interactions X,Y,Z occur in teamwork.
Today’s lesson:

“Please discuss about the pros and cons of collaborative learning and the role of computers!”
Collaboration Script: Pedagogical scenario for increasing the probability that interactions X,Y,Z occur in teamwork.
The effort to reach a shared understanding
“Jigsaw”

- Task: How to prevent a large earthquake?
- Roles:
  - Maire of San Francisco
  - Insurance agent
  - Security officer
  - Geologist
- Context: Previous experiments in Denver

In the Jigsaw script, every team member receives a subset of the information necessary to solve the task. This task cannot be solved without the contribution of each individual.
CSCL Script 2

Jigsaw

Phase “Groups”

Phase “Experts”
CSCL Script 2

Class

Intro

Task groups

a_1

Team

a_2

a_2a

a_2b

a_2c

a_2d

Individual

Roles

Expert groups

a_3a

a_3b

a_3c

a_3d

Debriefing

Decision

a_5

a_4
Grid

Place the concepts below on the grid to show the link between two concepts to define their similitude or difference with the help of grid members. You might change the concepts place to define other relations.

Referendum → Legislative

Democracy

Constituency

Target 3

Target 8

Election

Target 6

Target 7

parliament

Executive

Target 12

Target 13

Federalism

Target 15


"Democracy" vs "Election"

Relationship: Similar

Comments: Democracy is a form of government in which it is recognized that ultimate authority belongs to the people, who have the right to participate in the decision-making process called elections, to appoint and dismiss their rulers.
This script concerns declarative knowledge; namely, domains where students have to acquire a certain number of concepts and relate them to each other. Each team must build a concept grid—a sort of concept map. Each team is composed of several roles (the number of roles can be determined by the teacher) and each role necessitates reading several papers (the number of papers can be determined by the teacher) that correspond to the selected role. Typically, a student will play the role “Piaget” by reading papers from Piaget. Each student selects a role that has not yet been selected by another team member, and the system simply distributes readings assigned to each role. Then, when each student has learned about a subset of concepts, the team must build a grid in such a way that students can define (text entry) the relationship between two grid neighbor concepts. The way in which concepts are distributed among team members will determine who explains which concepts to whom in the grid construction activity.
DockLamp

A concept map
Holding a concept
Creating a link
Deleting a link
Deleting using paper
Deleting using fingers
Post-test: The cool interface led to lower learning outcomes because there was no need for negotiation.

No effect in Learning Gain

More Learning From Partners for Computer

- \( m_{COM} = 25.63, m_{TAN} = 21.88, \)
- \( t(14) = 1.24, p > .05, \) two-tailed

- \( m_{COM} = 13.63, m_{TAN} = 9.13, \)
- \( t(14) = 2.40, p < .05, \) two-tailed

Son Do Lenh
The effort to reach a shared understanding
Mastery learning

Individualisation

# kids > # computers

Socio-Cultural Theories

CSCL
"Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals."
Is this North-East?

No

What time is it?

10:30

Not that way

Side? Time? OK

Internalisation
We internalise social interaction because thinking is a dialogue with oneself.
What I can do alone

What I do in interaction with a more knowledgeable peer

Internalisation

Zone of Proximal Development

The zone of proximal development (ZPD) has been defined as "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).
The social structure of a knowledge community is not flat.

(Dutch policemen in charge of drugs)

Social Network Analysis
Online Learning Communities

- **Visitor** (no stable identity)
- **Novice** (learns how to integrate)
- **Regular** (comfortably participating in community life)
- **Leaders** (keep the community running)
- **Elders** (long-time regulars and leaders who share their knowledge and pass along the culture)

Learning a culture by participation

Mastery learning → Individualisation

MOOCs

Socio-Cultural Theories

adaptation
interaction

Adapating speed; selecting exercises,....

Collaboration

Forums, concept maps,....
Learning Theory  →  Pedagogical Model  →  Learning Technology

Skinner Behaviorism  →  Mastery Learning  →  eLearning Intelligent tutoring systems

Piaget Constructivism  →  Guided Discovery Learning  →  Simulations, microworlds modeling, problem solving

Vygotsky Socio-cultural theory  →  Collaborative Learning  →  CSCL
A plane describes the social structure of activities

it does not describe the cognitive processes:

- $\Pi_3$: individual brains are active during class-wide lectures
- $\Pi_1$: individual reasoning is shaped by (social) language.
Chapter 7: Social Cognition

The hardware is individual
But the software is social
Summary of chapter 7

1. Collaborative learning is often effective, but not systematically.

2. It is effective when rich interactions occur such as explanation, argumentation, mutual regulation.

3. To make it more effective, the technology or the script increases the necessity for students to produce these interactions.

4. The theory behind emphasizes that cognition is inherently social because thinking mostly relies on language.