

**UiO : InterMedia**  
University of Oslo

# Knowledge creation – metaphor of learning and baseline for technology development

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*TEL course, Oslo, April 8 2011*

# Today`s logistics

Time	What will we do?
9.30 -10.20	Presentation: <ul style="list-style-type: none"><li>- Theoretical perspectives</li><li>- Design highlights</li></ul>
10.20 – 10.35	<i>Break</i>
10.35 – 11.15	Presentation and demo KPE
11.15 – 11.25	<i>Break</i>
11.25 – 12.00	Hands-on training KPE

# General context and background

- Knowledge Practices Laboratory: integrated project funded by EU
- Aims:
  - Investigating knowledge creation processes in higher education and workplaces
  - Designing pedagogical scenarios &
  - Developing technology to support learning
  - Testing and implementing scenarios and technology in authentic settings

# Why do we need new theories/perspectives of learning?

- Knowledge around us increases and becomes more complex (epistemification)
- Work nowadays is increasingly more focused on dealing with and advancement of knowledge
- Participation in knowledge-intensive work requires individuals to learn new skills
- *How to conceptualize these challenges in education?*

# (Some) Theories of learning

- **Behaviorism** (Skinner, Watson, Thorndike)
  - behavior is determined by the environment (stimul - response)
  - *direct instruction, programmed instruction*
- **Cognitive theory** (Anderson, Simon, Schank , Bruner)
  - learning happens in one mind, mental mechanisms and information processing are determinant
  - *guided instruction*
- **Situated cognition** (Brown, Collins, Greeno)
  - knowing is inseparable from doing, always bound to the context
  - *cognitive apprenticeship, communities of practice*

## (Some) Theories of learning (2)

- **Constructivism – social constructivism** (Piaget, Vygotsky)
  - knowledge and meaning are embedded and created
    - from an interaction between their experiences and their ideas
    - in interaction with the social and cultural context
  - Constructionism (Papert, Resnick)
  - Discovery learning, inquiry-based learning
  - Knowledge building (Scardamalia, Bereiter)
  - Dialogisms (Bakthin, Linell, Wertsch)

# The knowledge creation metaphor\*

- Paavola & Hakkarainen (& Lipponen, 2004)
- Attempts:
  - to address some of the problematic aspects left unaddressed by previous perspectives
  - to provide the challenges posed by the increasing epistemification
  - to provide guiding principles for organizing teaching and learning
  - no theory of learning!

\*Paavola & Hakkarainen, 2005 (& Lipponen, 2004)

# Theoretical starting points

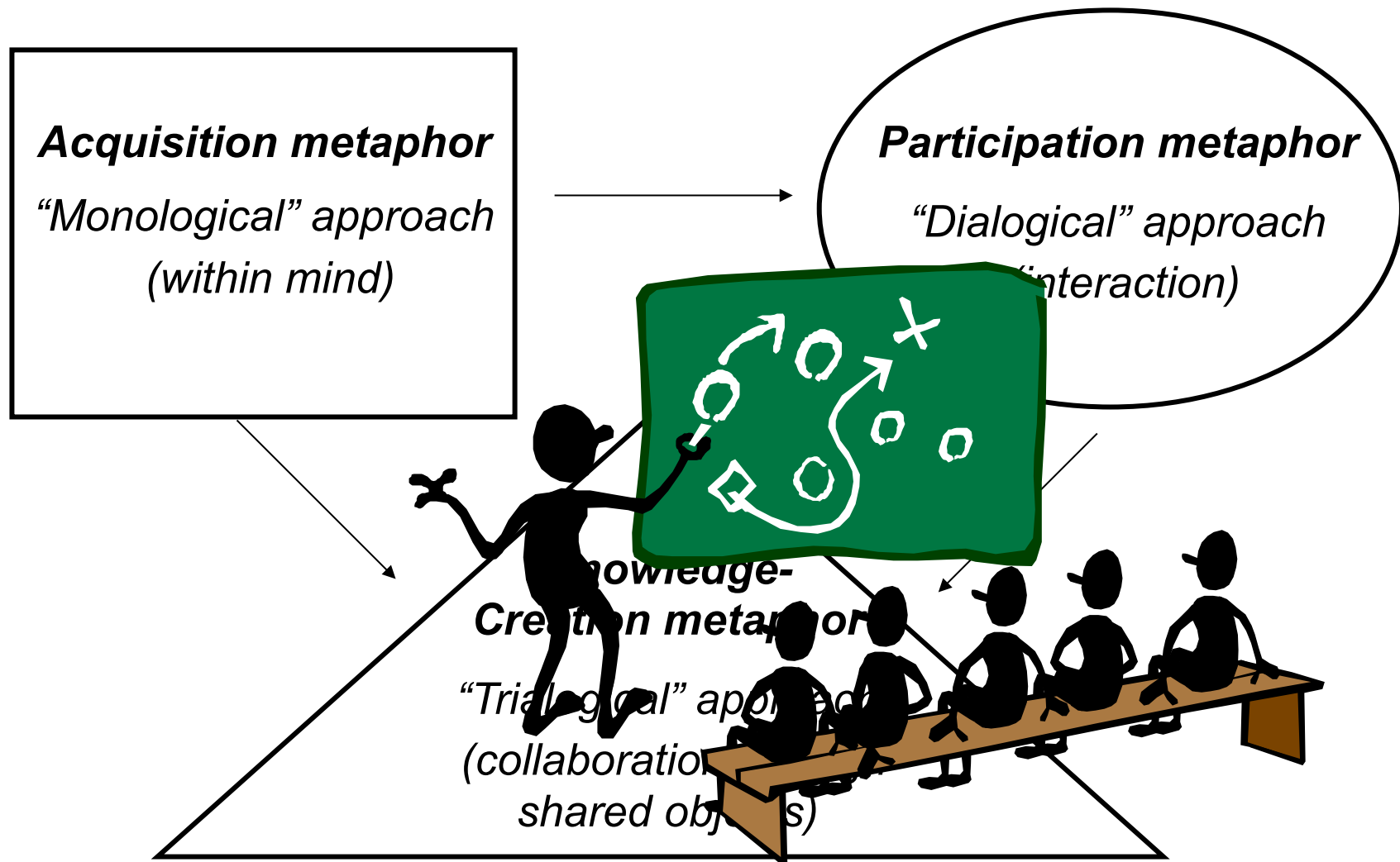
- **Innovative knowledge communities** (Nonaka & Takeuchi, 1995)
  - Tacit and explicit knowledge
  - Knowledge conversion: socialization, externalization, internalization
- **Activity theory and model of expansive learning** (Engeström, 1987,1999)
  - Learning situated in collective activity systems
  - Mediated by artefacts and signs
  - Follows a cycle



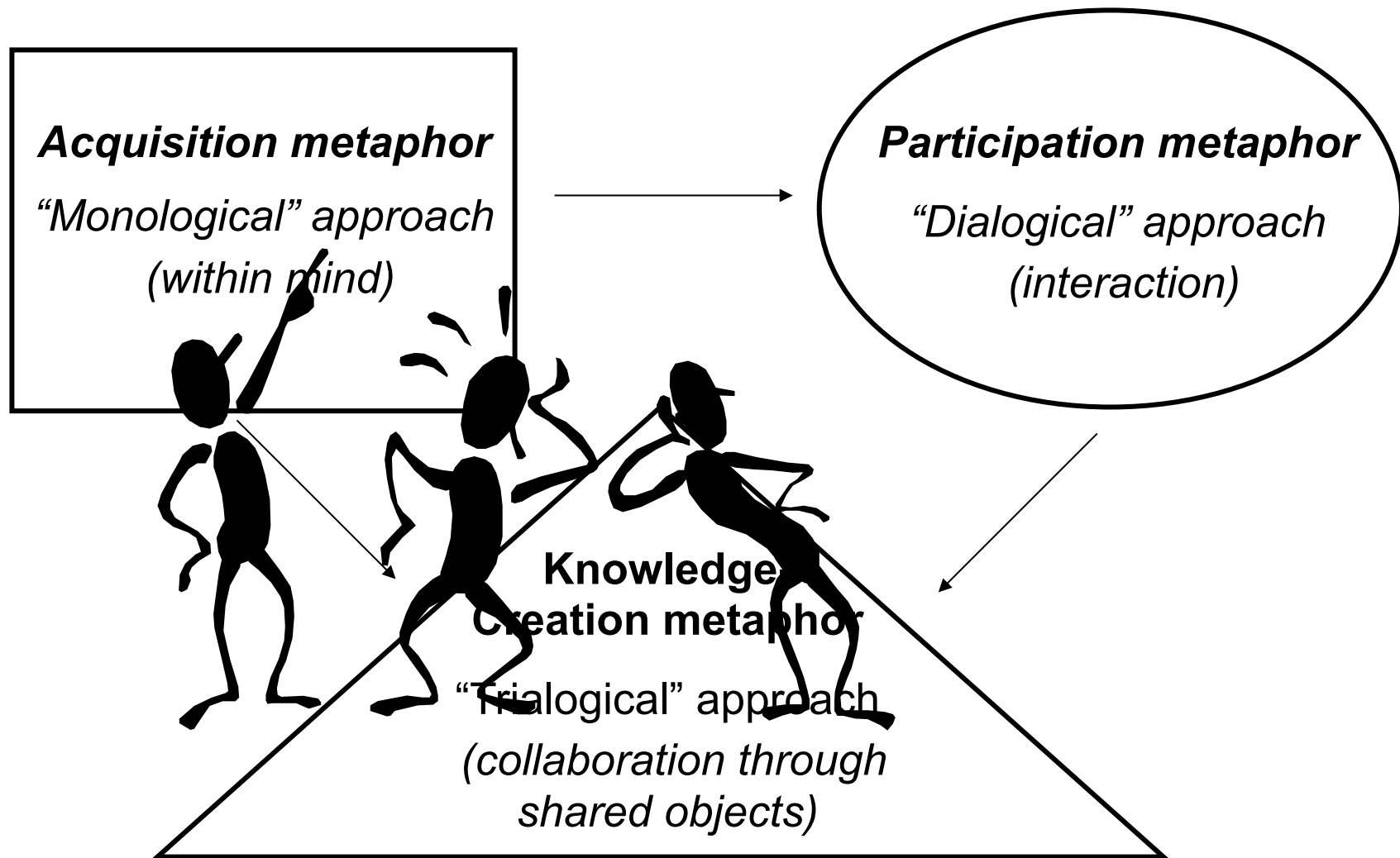
## Theoretical starting points (2)

- Knowledge building (Scardamalia & Bereiter, 1993, 2002)
  - Collective work
  - Conceptual artefacts (theories and ideas - see Poppers 3<sup>rd</sup> realm)
  - Primary aim to
    - solve problems
    - develop new ideas
    - advance communal knowledge

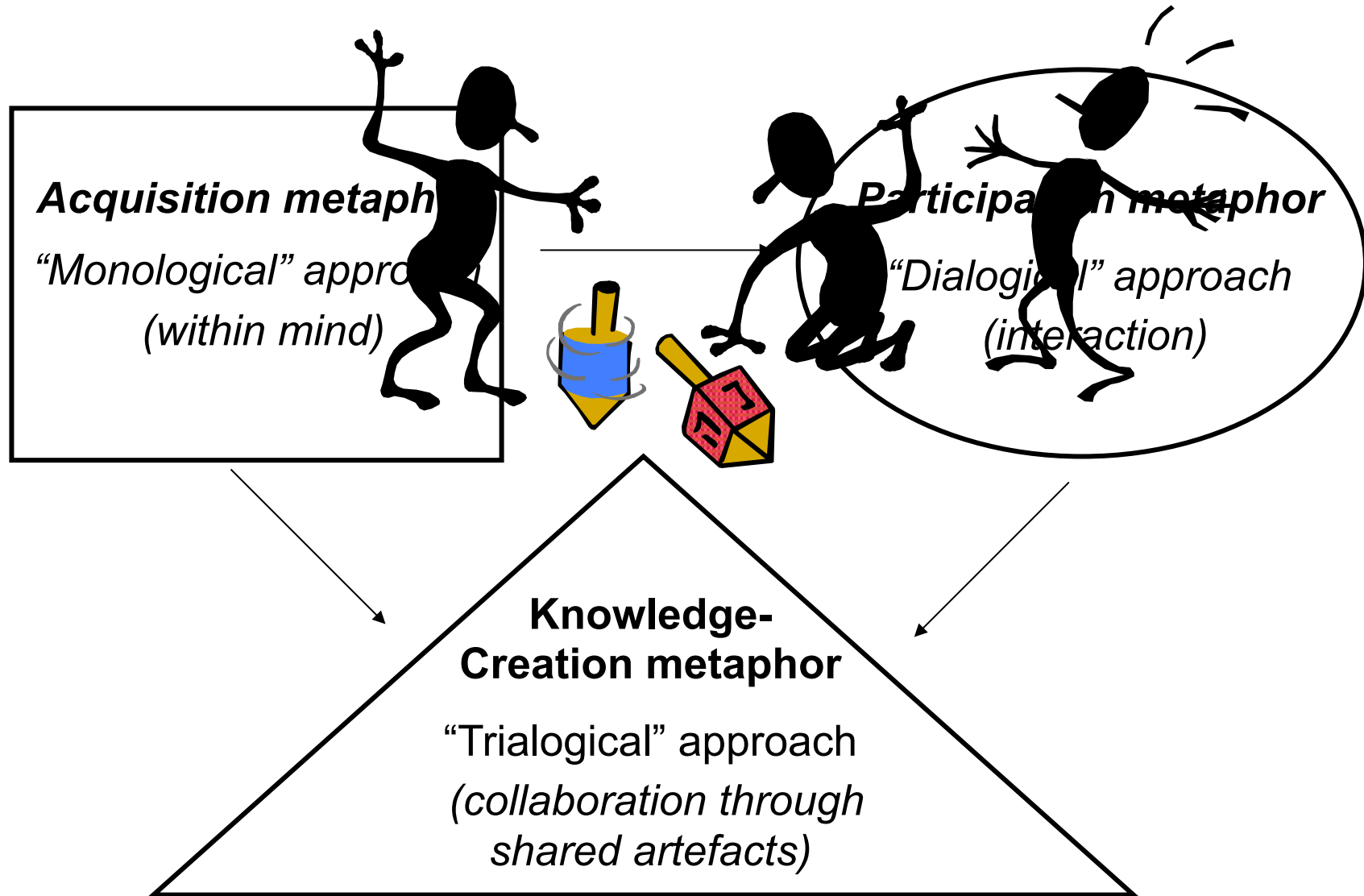
# Metaphors for learning



# Metaphors for learning (2)



# Knowledge creation metaphor



# Overview of the three metaphors\*

*Table I.* An overview of the ideal typical characters of the three metaphors of learning

	Knowledge acquisition	Participation	Knowledge creation
Main focus	A process of adopting or constructing subject-matter knowledge and mental representations	A process of participating in social communities  Enculturation, cognitive socialization  Norms, values, and identities	A process of creating and developing new material and conceptual artifacts  Conscious knowledge advancement, discovery, and innovation
Theoretical foundations	Theories of knowledge structures and schemata  Individual expertise Traditional cognitivist theories Logically-oriented epistemology	Situated and distributed cognition  Communities of practice Sociologically-oriented epistemology	Knowledge-creating organizations  Activity theory Knowledge-building theory Epistemology of mediation
Unit of analysis	Individuals	Groups, communities, networks, and cultures	Individuals and groups creating mediating artifacts within cultural settings

\*Paavola & Hakkarainen, 2005

# Main characteristics

- `Artefact creation metaphor of learning` (Paavola & Hakkarainen, 2005)
- Learning through *collaborative creation of knowledge objects/artefacts*
  - shared artefacts(s)
- Knowledge artefacts materialize knowledge emerging from learners' *individual knowledge & interactions* between learners
  - E.g.: Research reports, Essays, Design or Software products
- (Productive) Interactions among learners, learners with objects
- Evolving artefacts and transforming practices
- Mediation

## Reflection

Can you situate  
the knowledge creation metaphor  
in the context/landscape of the learning theories  
and motivate your choice?

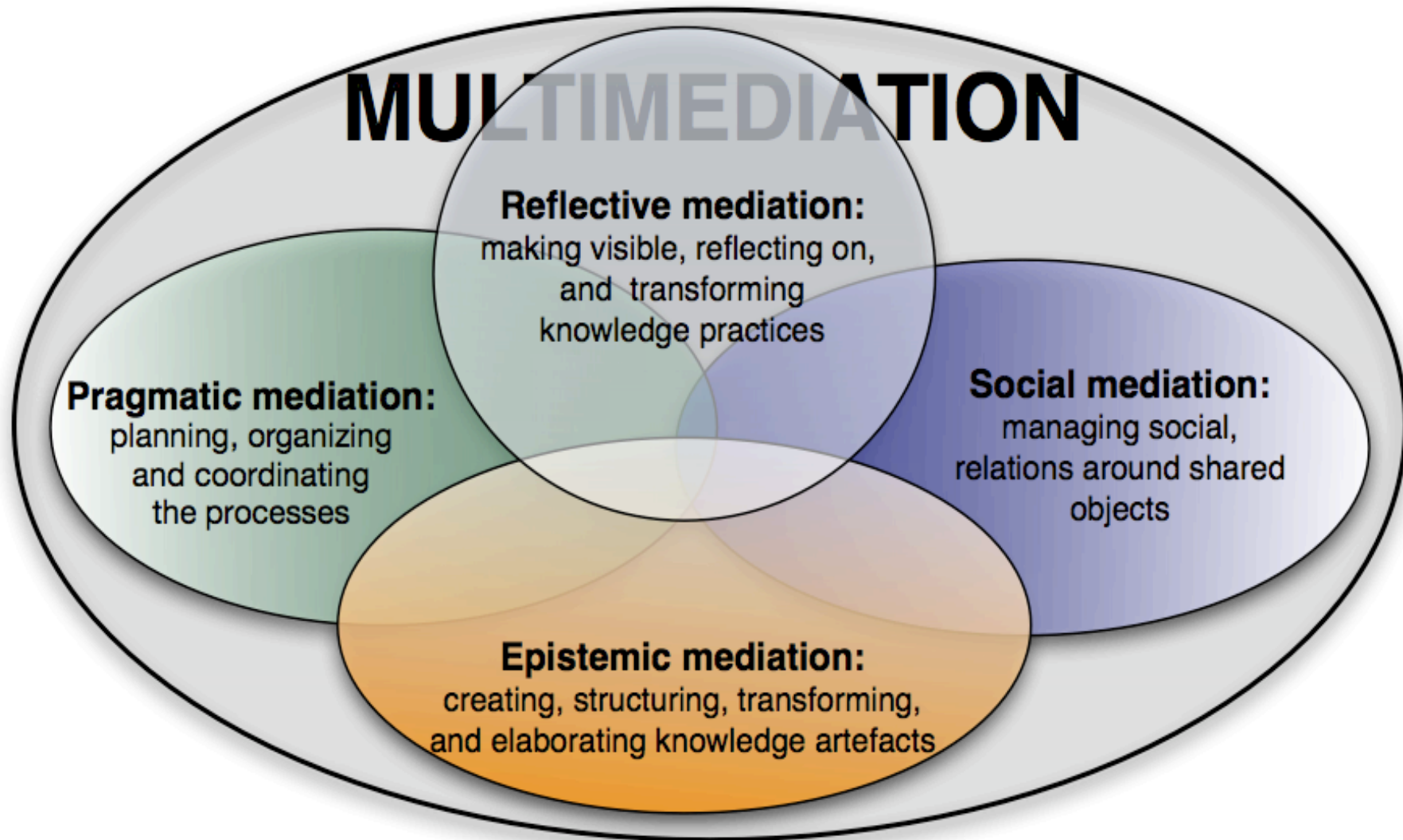
***Break***



# Principles for design – learning and technology

1. Focus on activity around shared objects
3. Interaction between personal and social levels
5. Fostering long-term processes of knowledge advancement
6. Development through transformation and reflection
7. Eliciting (individual and collective) agency
8. Cross fertilization of knowledge practices
9. Flexible tool mediation for dialogical activity

# Multimediation: Knowledge Practices Environment



# Type of tools and functionalities

Category of tools	Tools e.g.	Epistemic	Pragmatic	Social	Reflective
Collaborative production	Shared docs, Wiki, Notes, Comments, Weblinks, Tagging	X			X
Process organization	GANTT (process planning, Milestones, Calender, To Do		X	X	
Communi- cation	Chat, Object-bound chat		X	X	
<i>Analytic tools</i>	<i>Data Export, Visual Analyzer, Timeline-based Analyzer</i>		X		X

# Application scenario

- Settings
  - University of Applied Sciences for Teacher Education in the green sector
  - Participants: 73 pre-service teacher students (19 groups) and 8 teachers
  - 3 different courses
- Project content
  - Use of KC approach
  - Organize learning in groups on authentic projects
  - Collaboration f2f and using the online application (KPE)
  - Coaching by teachers f2f and in KPE
  - Long term projects – 5 months
- Example: Analysis and Design of Assessment situations

# Project design

Project meetings



Group coaching



Group work



‘Analysis and Design of Assessment situations’

<i>Mediation</i>					
<i>Project Phase</i>		<b>Epistemic</b>	<b>Pragmatic</b>	<b>Social</b>	<b>Reflective</b>
	<b>Exploratory phase</b>	Familiarizing with research topics	Organizing research topics	Getting to know each other	Review previous projects
	<b>Project planning</b>	<a href="#">Writing project plan</a> ; sketch design plan	<a href="#">Planning and organizing the project</a>	Allocating responsibilities tasks	
	<b>Elaboration</b>	Writing the ideas discussed with the group Creating drafts	Planning writing and design tasks	Communicating	Commenting on drafts
	<b>Delivery and reflection</b>	<a href="#">Finalizing research report</a> Design final product	Setting deadlines	Publishing report and design outcomes	Reflecting on project work

# Demo KPE

***Break***



## Reflection

How does the Knowledge Practice Environment represent the knowledge creation perspective?

*Explain using both the learning theoretical and the tool design perspective.*