



# COLDEX WP2

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## Pedagogical Models and Scenarios

Marcelo Milrad  
marcelo.milrad@msi.vxu.se  
MSI & CeLeKT,  
Växjö University, Sweden

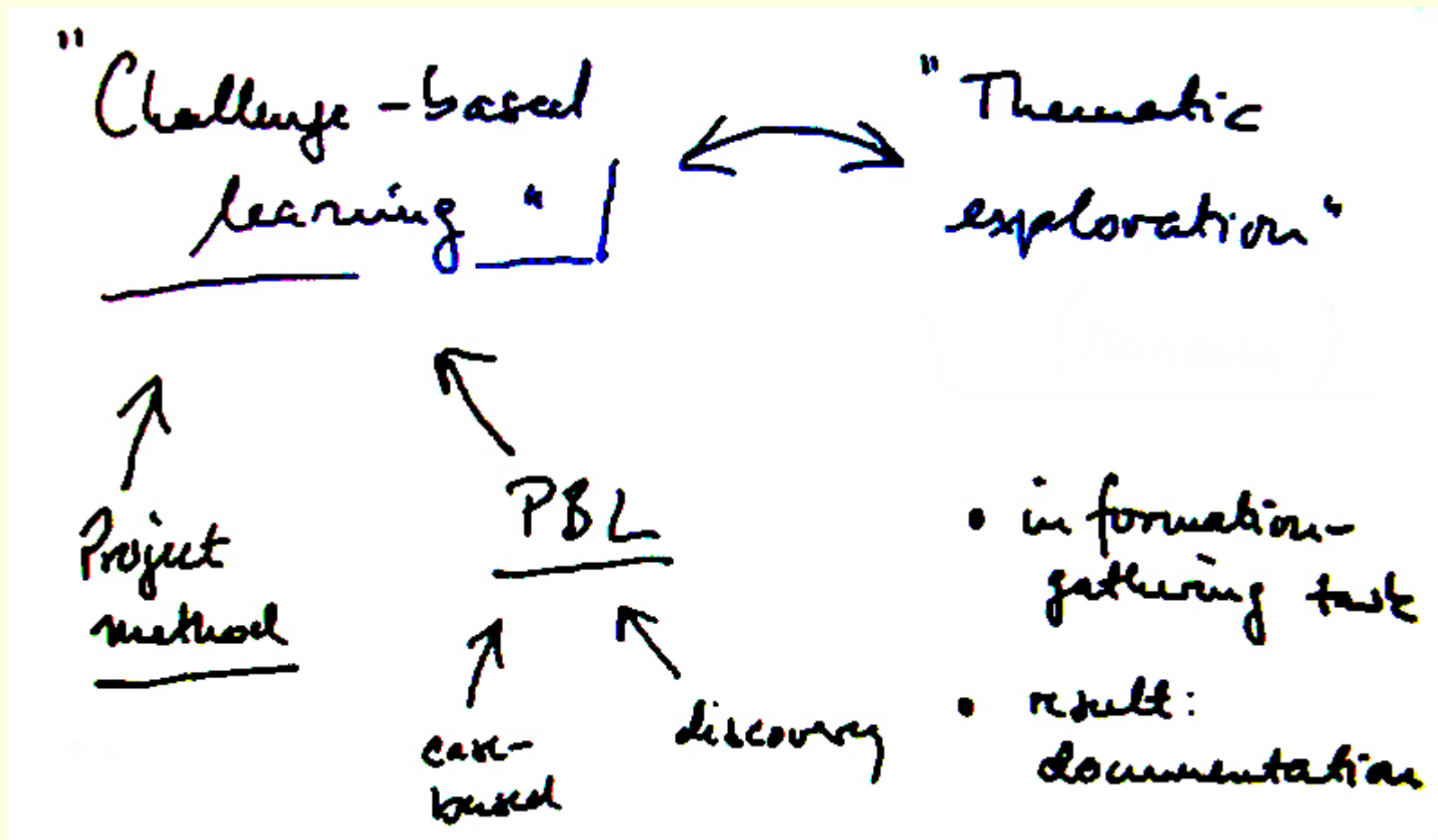


# Challenge Based Learning

- The main ideas in Challenge-Based Learning (CBL) are inspired by social constructivism and problem-based learning views, which stress curiosity and interest in real-world phenomena as motivational principles.
- The CBL method advocated by COLDEX (inspired by the Antofagasta meeting) can be described as extended problem-based learning, but it contains also some components from the experiential, project-based and decision-based learning perspectives.



# Challenge Based Learning





# Challenge Based Learning cont..

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- A challenge, in a challenge-based learning (CBL) activity, is initiated either by the COLDEX project, a teacher or a student group. The assignments or "challenges" to be solved might include ways to develop, design and implement solutions for problems related to scientific phenomena.

A meaningful learning activity consistent with CBL is to present learners with a challenge scenario and ask them to think about a number of possible solutions using a variety of interactive tools. Such an activity serves to center thinking around meaningful problems and is typically effective in facilitating small group collaboration.



# Challenge-Based Learning and other Learning Methods

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	<b>Discovery-based</b>	<b>Problem-based</b>	<b>Experiential</b>	<b>Challenge-based</b>
<b>Cognitive focus</b>	Knowledge inquiry	Knowledge construction	To grasp and transform experience	Knowledge interpretation, inquiry and construction
<b>Role of student</b>	Detective, picking up clues	Participant, searching	Active participant, choosing	Active constructor/designer
<b>Role of teacher</b>	"As mystery writer"	Coach	Facilitator	Coach, co-experimenter and designer



# COLDEX: Design Ideas and Educational Support

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- Include meaningful learning scenarios
- Design authentic problems and legitimate cases as the basis for learning activities
- Take into account the entire learning environment
- Support mediation among all the participants
- Foster a sense of collaborative learning community



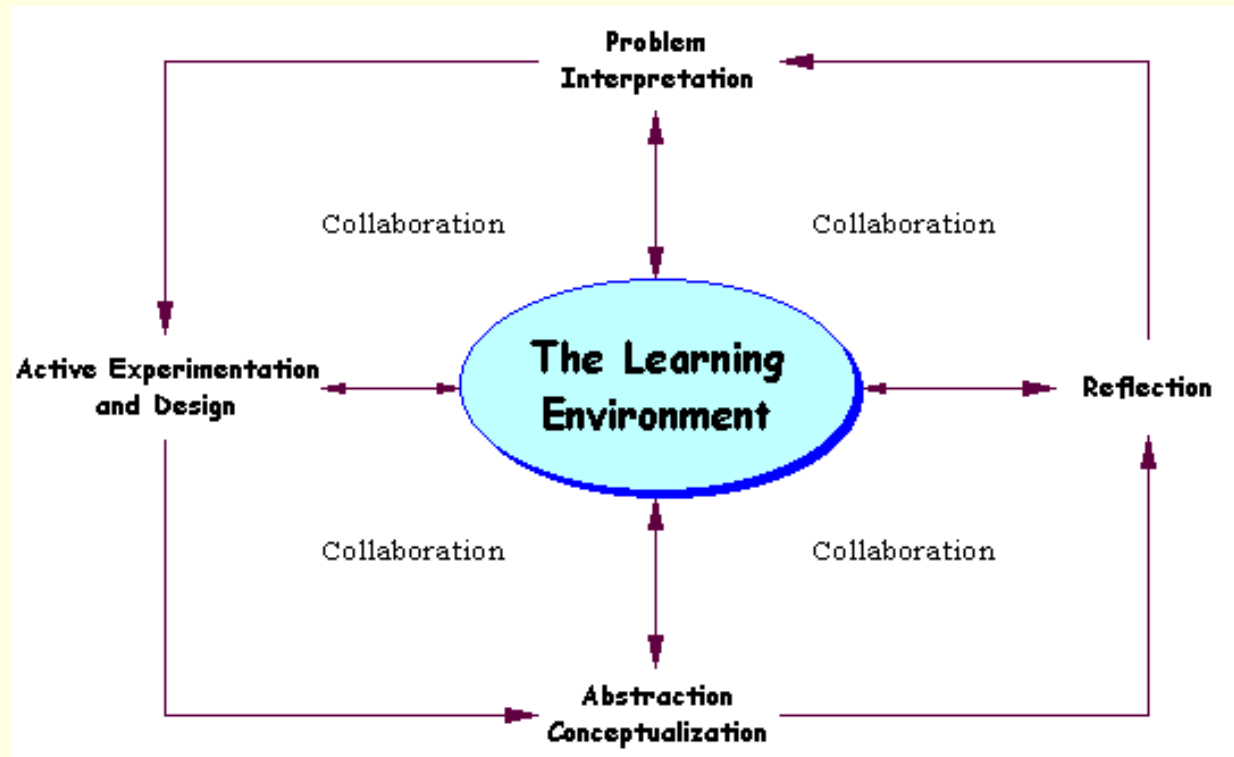
# COLDEX: Design Ideas and Educational Support

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- Provide support for the collaborative construction of knowledge objects, for the collaboration construction and analysis of problem solutions
- Provide tools to support negotiation of alternatives
- Provide both public and private feedback support mechanisms
- Provide mechanisms to share and exchange information, objects, views, etc.
- Facilitate a meaningful division of labour
- Support joint, online thinking and knowledge construction, commentary, etc.



# Educational Workflow



- Well defined learning activities (task workflow) and toolkits
- Challenge based-learning
- Integration between curricula and learning in informal settings
- Exchange between Science Center, School and University





# Learning Activities Landscape





# Educational Testbeds

Innovative practice and technologies:

- Science centers in Sweden/Chile
- Well established networks of schools:  
Enlaces (CL), AV-Media (SE), Duisburg (DE)
- Adult learners at UNED



# Experiment

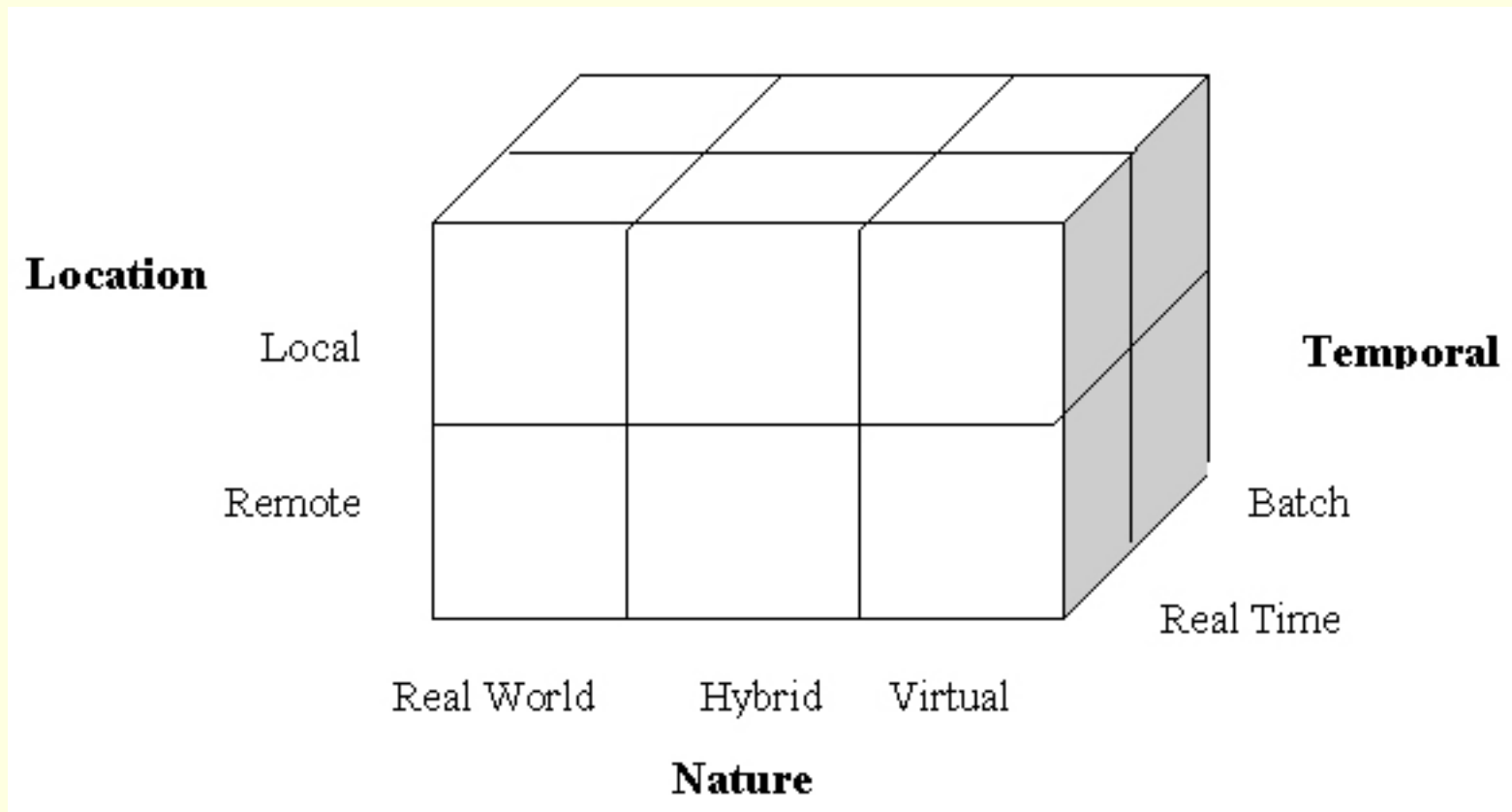
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- Has a learning goal
- Is a set of actions
- Takes place in a particular location & context
- Has an outcome related to the learning goal



# Experiment Taxonomy

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# Digital Experimentation Toolkits/DEXTs

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	manipulation and construction of physical objects	Modelling/ simulation	Distributed experim. (distributed software (data, application)	Time persp: short-long Event	Collab mode Local-Global
Astronomy I (telescope)					
Astronomy II (Lego Mindstorm)					
Earthquakes					
Biosphere					
Water rocket Fuel Cells					
Navigation without sight					



# Digital Experimentation Toolkits/DEXTs

DEXT	Area	Motiv.	X-Cult	Model
Astronomy I, II, ...	Phys K10+	"exploring space"	(+)	geom, 3D
Earthquakes	Phys K8+	"drastic" phenom.	+	?
Greenhouse (bio-div.)	Bio+ K8+	econom.	+	partial
Navigation w/o sight <i>Lego!</i>	Psy-Geo K8+	game?	?	3D, sound
<u>water rocket</u>	Phys K10+	"exploring space"	-	math. SD

} local



# Learning Toolkits

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In order to achieve the learning objectives and to conduct the learning activities we have described, we will provide teachers and students with a so called “Digital Experimentation Toolkits” or DEXTs.

As we define it in COLDEX, a toolkit includes experimental instructions, scientific background information, modelling and simulation tools, access to real scientific data, visualization and collaboration tools and the formulation of initial challenges.

**“A DEXT is a package of resources of the type described above”**



# Learning Toolkits

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DEXTs are not ready-made, experiential models describing just how to conduct a particular experiment. What we want to provide is an open-ended learning environment that stimulates learners to identify and solve a challenge according to the educational premises of CBL.





# Scenarios

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- What are the scenarios?
- Which are the different components?
- Collaboration Modes
- Development of a number of concrete scenarios
- Intercultural aspects
- Wrap up/common ground



# Scenarios

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Scenarios in COLDEX are defined as:

“A collection of educational activities which are inspired by the ideas behind CBL. These activities are designed for well specified domains and are supported by an educational workflow and a number of toolkits”



# Scenario Ontology

