

# From Collaborative Learning Patterns to component-based CACL applications

Juan I. Asensio<sup>1</sup>, Yannis A. Dimitriadis<sup>1</sup>, Marta Heredia<sup>1</sup>, Alejandra Martínez<sup>2</sup>, Francisco J. Álvarez<sup>1</sup>, María T. Blasco<sup>3</sup>, César A. Osuna<sup>4</sup>

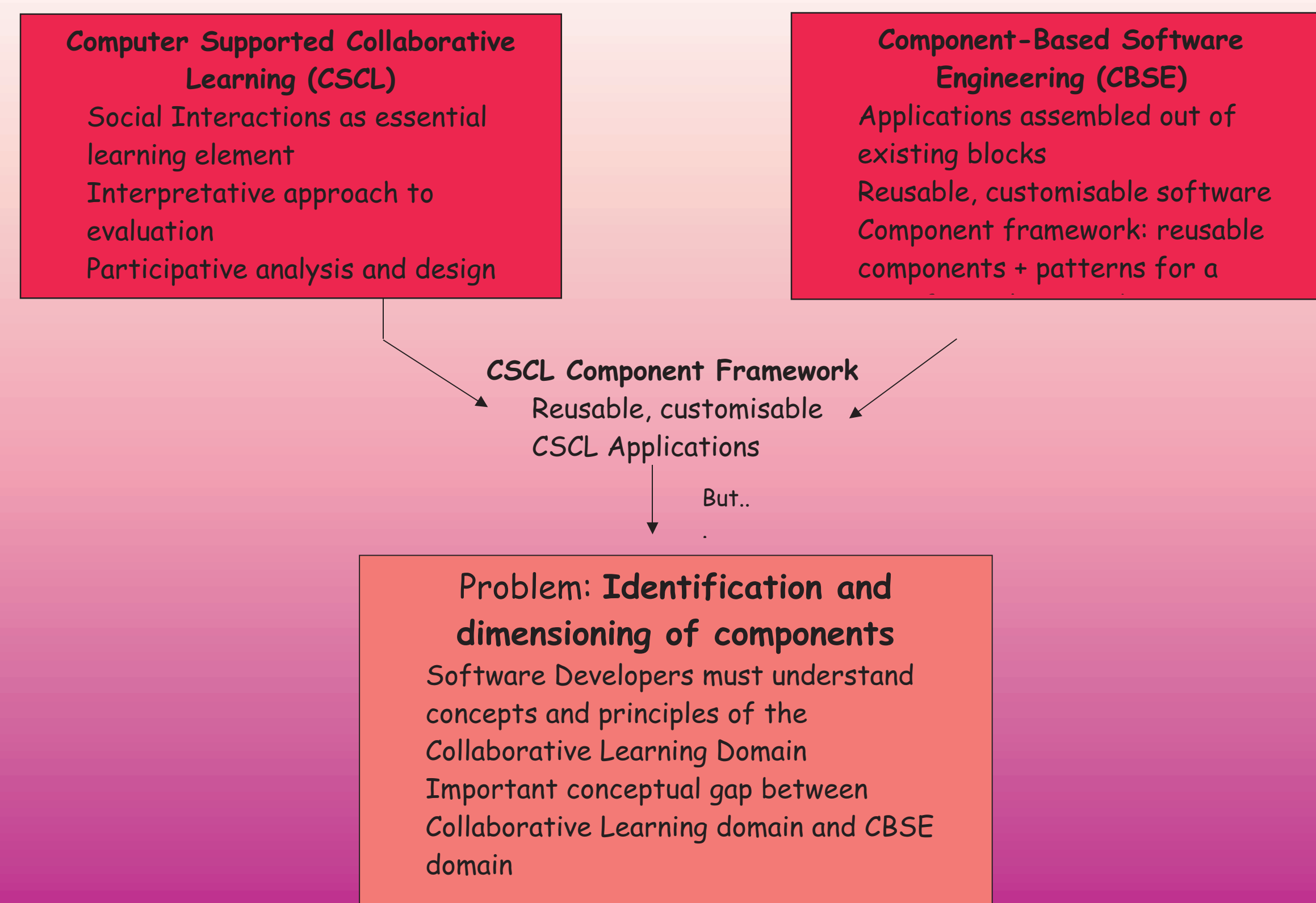
<sup>1</sup>*School of Telecommunications Engineering, University of Valladolid, Spain. {juaase@, yannis@, mherrod@ribera., fraalv@pireo.}tel.uva.es*

<sup>2</sup>*Faculty of Computer Science, University of Valladolid, Spain. amartine@infor.uva.es*

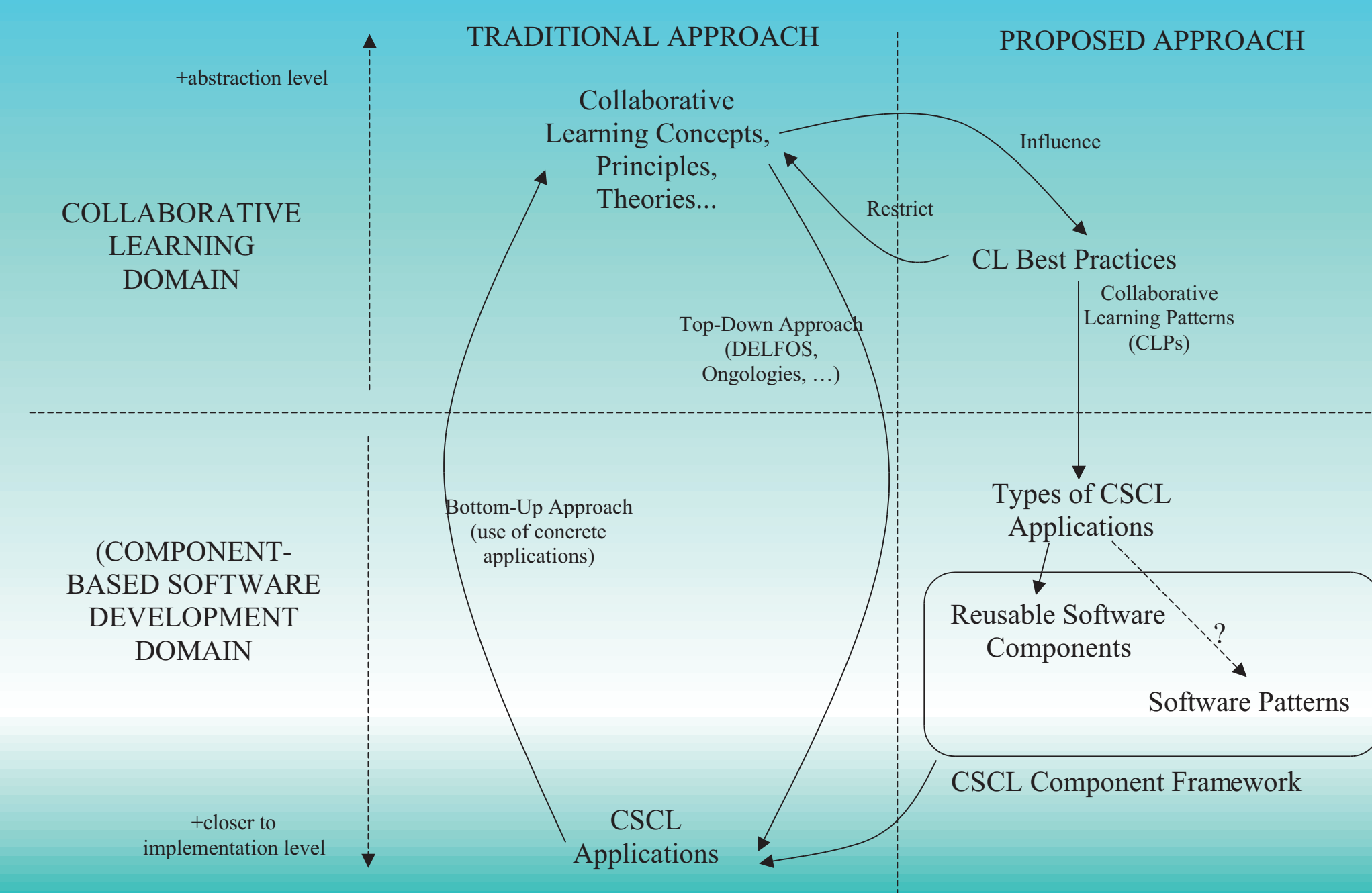
<sup>3</sup>*Faculty of Education, University of Valladolid, Spain. tbq@dlyl.uva.es*

<sup>4</sup>*Mexican Petroleum Institute, Mexico. Cosuna@imp.mx*

## Motivation



## Approaches



## CLP: Collaborative Learning Pattern

### Description of collaborative learning technique:

- Structure of interactions
- Types of interchanged information
- Manipulated objects

Defined by collaborative learning practitioners

Validated by pedagogues

Intermediate approach:

- In terms of conceptual richness
- In term of intelligibility from software developers

Useful for the identification and dimensioning of reusable components (applicable to CACL applications that use the same technique)

## Three CLP's: Jigsaw, Pyramid, and Simulation

Facet	Explanation	Example #1	Example #2	Example #3
Name	Name of the CLP	Jigsaw	Pyramid	Simulation
Problem	Learning problem to be solved by the CLP	Complex problem whose resolution implies the handling and/or collection of information that can be easily divided into disjoint sets and that can be used for the resolution of independent subproblems	Complex problem, usually without a concrete solution, whose resolution implies the achievement of gradual consensus among all the participants	Complex problem, usually without a concrete solution, whose resolution implies the assignment of different roles, and their associated tasks, to the participants. The final solution is the combination of the results of part or all the participants but it is always influenced by the work of all of them. Each participant is expected to acquire a set of abilities associated to its role
Example	A real-world learning activity suitable of being structured according to the CLP	Collaborative design of a computing system where the study of each subsystem is assigned to a particular participant	Collaborative proposal of the design of a computing system where each participant contributes with a complete design that is subsequently compared with other contributions and consequently refined	Collaborative proposal of the design of a computing system where each participant plays a different role: client, user, CPU provider, memory provider, etc...
Context	Environment type in which the CLP could be applied	Several small groups facing the study of a lot of information for the resolution of the same problem	Several participants facing the collaborative resolution of the same problem	Several participants facing the collaborative resolution of the same problem, although not all of them contribute explicitly to the final solution
Solution	Description of the proposal by the CLP for solving the problem	Each participant in a group (jigsaw group) studies a particular subproblem. The participants of different groups that study the same problem meet in an "Expert Group" for exchanging ideas. At last, jigsaw group participants meet to solve the whole problem. Each participant contributes with its "expertise"	Each individual participant studies the problem and proposes a solution. Groups (usually pairs) of participants compare and discuss their proposals and, finally, propose a new shared solution. Those groups join in larger groups in order to generate new agreed proposal. At the end, all the participants must propose a final and agreed solution	Each individual participant (or a group of them) performs the tasks associated to its role. Each participant collaborates with the ones dictated by its playing role. The final concrete product will be provided by several or all of the participants although it will be influenced by all of them
Actors	Actors involved in the Collaborative Learning activity described by the CLP	Teacher Pupil Evaluator	Teacher Pupil Evaluator	Teacher Pupil Evaluator
	Types of tasks, together with their sequence, performed by the actors involved in the activity.	<b>Pupil:</b> 1. Access to the information related with the subproblem 2. Individual study of the subproblem 3. Subproblem discussion in the experts group 4. Problem resolution in the jigsaw group 5. Result proposition 6. Process self-evaluation <b>Teacher:</b> 1. Global problem definition 2. Division of the problem in subproblems 3. Creation of jigsaw groups 4. Assignment of subproblems 5. Provision of useful information 6. Floor control system establishment 7. Decisions about control of time 8. Activity progress monitoring 9. Result evaluation	<b>Pupil:</b> 1. Access to the information related with the problem 2. Individual study of the problem 3. Individual solution proposal [REPEAT 4. Formation of groups 5. Group discussion 6. Common solution proposal (until only one group remains) 7. Process self-evaluation <b>Teacher:</b> 1. Global problem definition 2. Provision of useful information 3. Group dimensioning 4. Decisions about control of time 5. Activity progress monitoring 6. Result evaluation	<b>Pupil:</b> 1. Access to the information related with the role and the simulation 2. Interaction with other participants according to the assigned role 3. Result proposition (in any) 4. Process self-evaluation <b>Teacher:</b> a. Global problem definition b. Simulation environment definition c. Role definition d. Role assignment e. Provision of information about roles and environment of the simulation f. Decisions about control of time g. Activity progress monitoring h. Result evaluation
Types and structure of Information	Description of the types of information identified in the collaborative activity and how they are related	Input information needed for global problem resolution Partial information assigned to subproblems Subproblem resolution proposal Global problem resolution proposal Correct global problem resolution (optional)	Input information needed for global problem resolution Intermediate resolution proposals Global problem resolution proposal Correct global problem resolution (optional)	Input information for each role Global problem resolution proposal Correct global problem resolution (optional)
Types and structure of Groups	Description of the types of groups of pupils identified in the collaborative activity and how they are related	Jigsaw groups Experts groups in charge of subproblems	Growing pyramid groups	Groups associated to roles (optional)