Proposal of a Collaborative Learning Standardization

Toshio Okamoto, Mizue Kayama and Alexandra Cristea
University of Electro- Communications Graduate School of Information Systems
{okamoto, kayama, alex}ai.is.uec.ac.jp

Abstract

This paper reports on considerations and steps towards standardization [2] of the collaborative learning environment. This standardization will extend and widen the field of applications possible within the collaborative learning paradigm, and will make possible the usage of the fruits of years of research and individual implementations of the concept of collaborative learning, from our own laboratory and from others.

1. Collaborative Learning Support

Distributed [4,5] collaborative learning [1,3,6,7,8] support is a research domain that tries to find out ways to support the collaboration of multiple learners on the network (CSCL - Computer Supported Collaborative Learning), in problem solving or other cooperative curriculum activities, according to the used LT (Learning Technology). Compared to CSCW (Computer Supported Cooperative Work), CSCL has as a goal not so much the working efficiency, but the learning achievement efficiency, and the promotion of deep understanding of the subject field by the learner, combined with the recognition or meta-recognition of the achievement of this ability by other persons. The regular CSCL groupware implementation provides usually two types of activity space: a private and a collaborative working space, where the learners can exchange information in a synchronous or asynchronous manner.

2. Primitive Activities and Resources

Primitive activities in collaborative learning are: Dialogue (with Interaction), Data/Idea sharing, Observing/ suggesting, Turn-taking, Coordinating/ Control, Planning/ Executing, Initiative/ Supervising. The resources required in collaborative learning are: Dialogue Channel, Shared Workplace (shared object space), Technologically mediated remote communication (audio & visual), Personal Workplace.

3. Collaborative Environment Structure

For collaborative learning, we can differentiate between *learner-to-learner dialogue* (communication) and *other activities* (problem solving, etc.). When a learner faces a problem that s/he cannot solve, s/he can, in collaborative learning, exchange meaningful information via interactions with his/her learning companion(s). This can lead to understanding other persons' perception ways and also help in finding eventual inconsistencies in ones own judgments. Present researches analyze such interactions, their catalyzators and effects. Moreover, as the learning efficiency has been shown to increase in such situations, many systems try to positively encourage them via computer implementations.

4. Essential Structural Elements

Learners can belong to one or more groups and can be involved in projects or parts of projects together, therefore sharing a particular space, and work privately for the rest. The shared working place (*collaborative workplace*) contains the *dialogue support objects* for dialogue and information exchange support, the *collaborative working objects* for activity support, and the *collaborative memory*, for reference and information accumulation. On the other hand, the ***private working place*** contains the working depository of the *private working objects*, and the *private memory* for consultation and accumulation of private activities related information. Moreover, the information referencing layer contains information oriented towards individual and collaborative learning goals, learning materials, various educational data, libraries, educational applications, all-purpose tools, market applications, etc.

There are 6 essential structural elements of the collaborative learning environment standardization:
1. *collaborative learning environment expression*
2. *collaborative workspace expression*
3. *collaborative learning resource(s) expression*
4. *collaborative workplace expression*
5. *learner group model in collaborative learning*
6. *collaborative memory structure expression*
Due to the lack of space, these items are not detailed here.

5. Info Retrieval in Collaborative Learning

The collaborative learning support system has to able, at the learner's request, to send and receive information on the essential elements of both collaborative and private workspace. E.g., a loading function is necessary, which fetches collaborative/private work objects, requested by the group or by individual learners, from various resource(s) (*load_into* relation). This relation is defined within the essential structural elements of the collaborative learning environment. Another relation ensures the sending and receiving of problem solving communication data within the collaborative working place, between the dialogue support objects and the collaborative working objects (*link_to* relation). Another relation ensures the

inserting/ saving of objects, results and information from the private workplace of the private workspace as collaborative work objects of the collaborative workplace (*insert_in* relation). The relations between the collaborative work objects and the collaborative memory are "*store_to*", for storing work objects into the collaborative memory, and "*refer_to*" when referring objects already stored. We are gradually building the essential functions, which can be extended to serve any collaborative learning environment.

6. Interface

Standardization of the interface means defining the 5 interfaces below.

1. between learning resource(s) and collaborative work object(s)

2. between dialogue support object(s) and collaborative work object(s)

3. between the private workspace and collaborative work object(s) of the collaborative workplace

4. between collaborative work object(s) of the collaborative workplace and the collaborative memory

5. between the collaborative memory and group model

Due to the lack of space, these items are not detailed here.

7. Data Exchange

One of the essential structural elements of the collaborative learning environment is the *virtual agent*. The information exchange between the other essential structural elements is done via agent(s). The attribute(s) of the appropriate essential elements are stored in the collaborative memory as well as the learning log developed during the collaborative learning curriculum. Furthermore, depending on the request from group member(s) and collaborative work object(s), agents refer the information in the collaborative memory and integrate the exchanged information into a defined form. The concrete function of agents is to cope with the behavioral differences of the essential structural elements. Moreover, the information exchange protocol content varies, according to the transmission source and reception destination, and according to the behavior or functions of the bi-directional structure of the essential elements. However, the basis functions and structure of the agents in the collaborative learning environment are defined simply as the *exchange, deletion* and *addition* of essential structural elements.

8. Collaborative learning Agent

The standardization target delimited by the hypothesis is represented by the 5 items below.
1. collaborative learning environment agent(s) structure
2. collaborative learning environment agent type(s)
3. essential elements of 1.
4. attribute(s) of 3.
5. relation(s) of 3.

8. Conclusion

The standardization of the collaborative learning environment is a collective effort and an ongoing process. We have outlined here some of the basic considerations and steps we intent to take in the future towards this standardization.

Further required functions for the collaborative learning environment are as follows.

● *Coordination* (constrained and mediated by external environment)

● *Reification* (material evidence in the external environment)

● *Illustration* (external representation)

● *Storage* (in later use, for the purpose of reflection)

Examples of general tools for supporting collaboration are as follows.

● Concept Mapping tool

● Editors for argumentation network

● Work flow (planning tool)

● WYSIWIS (What you see is what I see)

At the university of Electro-Communications, Japan, we have integrated a few parallel projects that have related goals concentrated around distance-learning and life-long learning, also known under the name RAPSODY [4] and RAPSODY-EX [5]. The proposed standards are being gradually implemented and brought to life within these projects. Real-life feedback will be used to correct, improve and fine-tune the proposed standard.

Reference

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