

L³ - An Infrastructure for Collaborative Learnflow

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ABSTRACT

In this paper we sketch an approach to integrate courses for individual learning into a powerful CSCL environment by using the Point of Cooperation (PoC) approach. We show how PoCs can be set up to create a collaborative learnflow, which exploits individual learning phases as well as different phases of asynchronous and synchronous collaboration. The implementation of the PoC approach in the L³ project is presented.

Keywords

CSCL, collaborative learnflow, Point of Cooperation (PoC), L3.

MOVING FROM INDIVIDUAL TO COLLABORATIVE LEARNFLOW

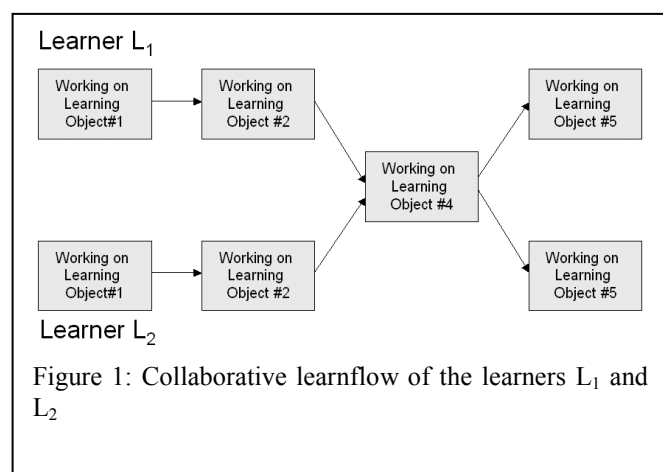
How can new learning technologies support cooperative learning? In general, three basic types of learning processes can be differentiated in computer supported learning: Individual learning, synchronous and asynchronous collaborative learning:

Individual learning describes a scenario with a single learner performing a learning activity without others (such as peer learners or tutors). This includes activities such as reading a text, watching a video, reflecting on a picture or writing a summary. The learner can control the learning process, e.g., the speed and the number of iterations.

Synchronous collaborative learning is based on immediate learning together with peer learners or tutors. Here, the learner has less control over the learning process. Activities must be coordinated with the other group members.

Asynchronous collaborative learning happens when a learner manipulates an artifact (such as a document or a message), which has been or will be handled by one or more peers or tutors at a different point in time. Here, the learner has more control over the learning process opposed to synchronous collaboration, e.g. w.r.t. time and place.

Usually, a learner is confronted with different kinds of problems while working on a course. In order to deal with these problems without switching between different learning environments, an ideal learning environment should support flexible coupling and combination of the mentioned learning scenarios during a learning process. Concretely, the learner should be able to switch between synchronous and asynchronous communication in an intuitive way: If the learner needs immediate connection, the required tools should provide the demanded communication channels instantly. Alternatively the learner should have immediate access to asynchronous communication channels if there is no need or opportunity for real-time communication with a peer learner or a tutor.



We consider a course as a set of learning objects interlinked by relations. Each learning object describes a learning activity to be performed (such as reading material, performing an exercise). The course resembles a schema definition of potential learner behaviour, i.e. in each phase of the learning process the learner can proceed to another learning object to extend her knowledge. The learnflow describes a concrete sequence of activities in that schema. During individual learning in a course, the learner initiates his learnflow by performing the start activity, e.g. reading the title page of the course. He extends his *individual learnflow* stepwise with each new learning activity he performs in the course; the learnflow consists of a sequence of activities.

If a course can be used by a learning group in the way that learners perform (some of the) course's activities together

then we define the collaborative learnflow as the graph consisting of the individual learnflows where activities, which are performed collaboratively, are merged. Figure 1 shows the collaborative learnflow of two learners, which collaborated on Learning Object #4. During cooperative learning, the *collaborative learnflow* defines the joint behaviour of the learning group and the interactions between the learning partners.

We call an opportunity to cooperate given a specific learning context a *Point of Cooperation (PoC)* (see Wessner & Pfister, 2000 for more details). We call a cooperative activity an *intended cooperation* if it is logically and didactically incorporated into a course at a specific position in the course. The corresponding component in the learning environment is called an *Intended Point of Cooperation (IPoC)*. From a structural point of view IPoCs are treated in the same way as non-collaborative learning objects: IPoCs are related to other learning objects of the course. With IPoCs the course author can define "when", i.e. at which position in the logical course structure, "what" cooperative activity should be performed. The cooperative activity is defined by a set of parameters, such as group size, duration, instructions, learning material, tools, and structure (a system-controlled cooperative learning method). Depending on the nature of the cooperative activity the group has to perform, we distinguish a number of IPoC types., e.g. group discussion, collaborative brainstorming, pro/con-dispute, cooperative text processing. An IPoC is integrated into a course as a learning object. Thus, an IPoC can use the knowledge about the author's intentions to support the user in his collaboration. Using PoCs smooth transitions between the individual and collaborative learning scenarios can be achieved: A user starts in individual learning. If the user encounters an IPoC in the course, the user can initiate an intended collaborative learning activity. Because the actual performing of the collaborative activity depends on runtime requirements, especially the availability of peer learners, encountering an IPoC and activating it are two separate steps. Otherwise the non-availability of peers would block the learner. Upon ending the IPoC tool the learner is back to individual learning.

IMPLEMENTATION: THE L³ PROJECT

In the L³ project, which stands for 'lifelong learning', twenty organizations cooperate to develop an integrated Internet-based learning infrastructure for life-long learning and continued training. The partners include infrastructure and technology providers, content providers, training organisations, and research institutions with a didactical or technical focus. In L³, web-based courses consists of a number of learning objects. Especially, a learning object can be an IPoC, as explained previously. IPoCs are defined as learning objects by the author during the course design using an IPoC editor. E.g. for a brainstorming activity definition, the author defines group size, duration, topic, seed words and instructions for the intended brainstorming activity. The course material is presented in a web browser to the learner. An additional tool, the L³ Communicator provides the means to start IPoCs after they have been reached in the course material by the learner. The so-called PoC-Pool, a view of the L³ Communicator, is used to manage all IPoCs of a learner. The actual instantiation of an IPoC is a non-trivial task, e.g. participants need to be selected according to appropriate criteria, matching communication tools have to be activated, and the results of the cooperation processes need to be handled. Learning groups are formed manually by a tutor or automatically by the system. A number of tools supporting specific cooperative learning methods, i.e. the IPoC types mentioned above, have been developed. Currently, version 2 of the platform has been deployed to ten learning centers throughout Germany in 2001. Authors were trained in special workshops to integrate collaborative learning into their courses. We are preparing a large-scale evaluation of the L³ environment to learn about the usability and the acceptance of the PoC approach.

Compared to existing CSCL environments an environment based on the PoC approach supports individual and collaborative learnflows. With PoCs, course authors can flexibly define collaborative activities integrated with the course w.r.t. to group size, learning method, duration etc. Thus, in the environment presented here, learnflows cover individual and collaborative learning scenarios and feature a variety of collaborative learning methods. In general, this approach allows new ways to represent and analyse group learning behaviour.

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