

Towards an Analytical Framework for CSCdistanceL

Annita Fjuk

*Department of Informatics
University of Oslo*

Abstract

This paper presents a framework for evaluation of computer applications in relation to the new and unique phenomenon of learning: Computer supported collaborative distance learning (CSCdistanceL). The framework may also be considered a means for designing computer applications mediating human actions of collaborative learning. Problem oriented project pedagogy is used as a pedagogical foundation to understand collaborative learning. The crucial aspects of this pedagogical viewpoint are interpreted into dialectical contradictions. The contradictions constitute a basis for understanding the incorporated role of the computer application in the various human actions of collaborative learning.

Keywords — Problem oriented project pedagogy, distance learning, dialectical analysis, evaluation and design of computer-based applications.

1. Introduction

This paper is a short version of a paper with the title *An analytical framework for evaluation and design of computer applications mediating collaborative distance learning*. In this short version, only the basic argumentation and suggestions are described. The empirical basis for the framework is only briefly presented.

The framework has been developed on basis of various studies (over a period of four years and still continuing) of mainly two different learning situations in which computer-based applications—based on asynchronous and text-based communication—have a crucial but different role: One learning situation has its foundation in the long tradition of distance education—correspondence education. The pedagogical model is based on an information-transmission paradigm of learning and communication, in such a way that individual production of texts and distribution of these for comments are emphasised. The computer-based

application is considered a medium for socialisation in learning situations characterised as highly individual and independent.

The other learning situation has its foundation in a pedagogical viewpoint introduced (in Denmark) by the Danish pedagogue Knud Illeris, who developed what he called an alternative didactic (Illeris, 1974). This pedagogical viewpoint is problem oriented project pedagogy. The fundamental principle is that the students constitute an indivisible community in the collaborative process of analysing a phenomenon in relation to present conditions and problems of society. In contrast to a learning situation analogous to an information-transmission paradigm of communication, the intention has been to integrate a computer application *not* only to distribute written texts, but to articulate individual contributions and to mediate interaction between the peer-students, to get the whole cooperative work done.

In spite of the two different pedagogical viewpoints, the both learning situations are considered a complex and conflicting frame of computer supported distance learning because of various factors, and the interdependence between them: Pedagogical aspects, technical factors directed towards the limitations and possibilities of available computer applications, administrative and organising factors, factors directed towards design of courses and subject matters, human attitudes, etc. These interconnected factors are crucial to understand CSCdistanceL as a new and unique phenomenon of learning, and indicate that the computer application does not necessarily have the crucial meaning of a successful learning process. However, the signification of available computer applications has most critical *pedagogic consequences* in learning situations emphasising the students interdependency in their work. In such situations, the communication structure presented in the available text-based and asynchronous computer applications constitutes a conflicting frame in relation to the dynamic process of inter-human actions.

This paper is restricted to focus on the interconnection between 1. *Human actions directed towards the collaborative learning process*, and 2. *The computer application*. This relationship is the point of departure for a framework developed for evaluation of computer application in relation to CSCdistanceL. A fundamental assumption is that a framework developed on basis of problem oriented project pedagogy, will cover the most crucial aspects of collaborative learning in such a way that the framework can be applied in relation to *other and less complex viewpoints* on collaborative learning at distance.

Section 2 presents the problematic domain of this relationship. Section 3 presents the analytical framework based on this problematic domain, and section 4 briefly discuss how it can be applied.

2. The Contradiction between Computer-based Applications and Collaborative Learning

A fundamental requirement of collaborative learning is that a common environment of shared recognition and experience is established (c. f. e. g. Schrage, 1990). Such a community is not created by simply a process of information transmission and distribution (Schrage, 1990, Lave and Wenger, 1991) or assimilation (Piaget, 1950, Illeris, 1974), but in a process in which the students have a certain degree of obligation to each other. The students may have different interests, hold various viewpoints and meanings, and make diverse contributions to the actions. However, the participating students need to have a shared understanding concerning what they are doing and what that means for their individual development process and for the development of the learning community which they are a part of (c.f. Lave and Wenger, 1991).

The primary target group for most distance- and open learning situations, is the adult work force of our society. The student—the adult worker, usually with an established life with family and friends—needs a flexible (further) educational situation free from place-, and often time, constraints. In collaborative learning at *distance*, a computer application designed for collaborative activities is a fundamental means to create a community of shared experience and recognition. However, such a community is only created if the computer-based application mediates the human actions in such a way that the individual students *do have a feeling of participating* in such a community. A basic assumption for this is that the computer-based artefact is incorporated in various human actions varying in relation to the situation at hand. With basis on this assumption, CSCdistanceL must be understood as two incorporated aspects: 1. *Human actions directed towards the collaborative learning process*, and 2. *The computer application*.

Computer applications applied in most distance- and open learning situations (cf. Fjuk, 1993, Mason and Kaye, 1989, Kaye, 1992, Mason, 1994, Georgsen and Dirckinck-Holmfeld, 1993), represent a written and asynchronous communication form (various computer conferencing systems, bulletin board systems and e-mail systems). This category of computer applications is widely used because of their technical and economical *availability* for the target group. Because of the requirement of flexible learning situations, the students need to participate in the learning process from places most convenient for them, from their homes. Consequently she has not powerful, expensive computers and software, and broad-band networks available. These technical means are often considered as a requirement for collaborative activities (c. f. e. g. Bannon and Schmidt, 1992), and are e. g. available for students participating in CSC(distance)L from the campus of a university and a college.

The text-based and asynchronous communication form presented in most of the available computer applications, represents an information-transmission paradigm of inter-human interactions. Dialogues take place with an analogy to the process of writing, sending and receiving a letter (Sorensen, 1991). Thus, the dynamic and spontaneous nature characterising a dialogue is fundamentally on the premises of the written language. The dialogue lacks the expressive power and interpretative cues resulting from the loss of visual information and feedback opportunities (Eklundh, 1986). In distance learning situations, the written and asynchronous dialogue is the dominating aspect of cooperation, because the students to a large degree do not have any other possibilities to cooperate.

The students report that in a collaborative learning process—based on problem oriented project pedagogy (see next chapter)—it is extremely time consuming and a factor of frustration to carry out inter-human actions directed towards consensus seeking and inter-human conflicts in general, but especially in the fundamental problem formulation phase and in the articulations of each other's contributions to the project (Løth and Køhler, 1995, c. f. e. g. Georgsen, 1995, Dirckinck-Holmfeld and Fjuk, 1995). The students emphasise that the computer application is a means to support competition and authority, rather as a means to support creativity, mutual respect, tolerance and trust. This may imply a feeling of independence and freedom (Eklundh, 1986), and the students may have a reduced perception of being an active participant in a common learning community (Georgsen, 1995). The feeling of mutual commitment and mutual interdependence, which is essential to create the common learning environment, may not appear in the individual student's mind.

Thus CSCdistanceL as a phenomenon of learning, implies a conflicting relationship between the two incorporated aspects: *Human actions directed towards*

the collaborative learning process, and the computer application. These two aspects are presupposing each other. At the same time the aspects are conflicting each other and may cause a dissolution of the relationship between them. This conflicting frame may have crucial pedagogical consequences. However, the degree of the consequence is dependent on the fundamental perspective on collaborative learning. In learning situations not having the main focus on inter-human interactions and mutual commitment, but having the main focus on production of texts and information distribution, this conflicting frame is not so obvious. In such situations, the communication structure presented in the computer application and the basic view of learning, represent both an analogy to an information-transmission paradigm of communication. However, the conflicting frame may be present because of other aspects (out of the scope of this paper).

The relationship between the two aspects is fundamental to understand CSCdistanceL as a phenomenon; It distinguishes and characterises the learning form from other learning forms.

Such an understanding of CSCdistanceL is analogous to Mao Tsetung's (1972) concept of *fundamental dialectical contradictions*: The contradiction that characterises a phenomenon and distinguishes it from other phenomena. A contradiction consists of two aspects, simultaneously and mutually presupposing and conflicting each other. In general, dialectical theory is suitable to describe and understand the wholeness of situations and phenomena that are characterised as complex and difficult to penetrate into (Øgrim, 1993). Every phenomenon is understood in an interplay with its surrounding environment, and every phenomenon is understood as a number of contradictions that are interconnected. Mao's interpretation of dialectical contradictions is to a larger degree than Hegel's these-antitheses-and-syntheses schema, concentrated on the dynamics within a contradiction (ibid.), i. e. one of the aspects of the contradiction will—dependent on the situation—dominate the phenomenon. However, the objective in some situations is to create a balance between the two aspects (ibid.). CSCdistanceL is understood as a new and complex phenomenon of learning, and the dominating aspect of this phenomenon of learning has been the computer application. The artefact forces the participating students into rigid and artificial structures of human actions similar to a information-transmission paradigm of communication. An analytical framework considering collaborative learning as complex whole phenomenon of human actions—and not simply as information transmission and presentation—is thus needed.

By using Mao's concepts of dialectical contradictions, CSCdistanceL is understood as the fundamental contradiction consisting of the two presented aspects. This contradiction is considered as the point of

departure for developing a framework emphasising the dynamic balance between the two aspects.

3. The Analytical Framework

Problem oriented project pedagogy is applied as a basis for the framework, firstly because it emphasises crucial aspects for creating a common learning environment: Inter-human interactions and -relations, and a certain degree of commitment between the participating students to gain both individual and collective development of knowledge and experiences. Secondly, it is an *analytical viewpoint* without any principles and strongly directing methods for learning. The fundamental principle is to contribute to changes and development in society through critical attitudes and awareness in relation to the conditions of society. Learning is organised as *cooperative work in projects* and this organising of learning can then be considered a certain kind of work. The analytical viewpoint has, because of these facts, a close relationship to the social practice of work and cooperative work. Totally, project oriented project pedagogy can be analysed in combination with theories from work and cooperative work. When it comes to the computer application's role in this—to understand CSCdistanceL as a learning phenomenon—theories and empirical research from the close related field of CSCW can be applied.

Figure 1 illustrates the analytical framework. The fundamental contradiction is shown to the left of the figure. The fundamental contradiction is further analysed by considering two sub-ordinated contradictions: 1. The contradiction between *work task* and *cooperation*, and 2. The contradiction between *tool* and *medium*. These contradictions—and the relationship between them—are presented in the next two sub-sections.

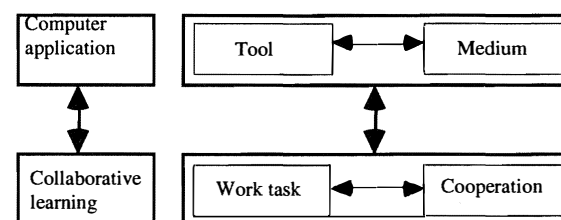


Figure 1. The analytical framework of CSCdistanceL.

3.1. The relationship between work task and cooperation

Problem orientation is a work-method, which prerequisite that there exist a problem that can be recognised and experienced as a conflict, a need, and a wish of changes. A problem does not have a prerequisite solu

tion for the students, but is considered as something to understand and to penetrate into. The work tasks have to be directed towards conditions and problems of society. According to Illeris (1974), problem orientation can not alone be considered as fundamental. An other critical aspect is participants' control (Danish: *deltagerstyring*), i. e. the students have the responsibility for their own actions through active participation. The students represent an indivisible community that manage the participants' control, in such a way that they have a shared understanding concerning what they are doing and what that means for the individual learning process and for the development of the collaborative community. The relationship between participants' control and problem orientation is dialectical.

The fundamental principle of problem oriented project pedagogy can be interpreted as a dialectical contradiction between *the superior problem presented in various work tasks* and *cooperation*. Cooperation is the common term of *inter-human interactions*—and mutual commitment—and *articulation of the students' contributions*. Such an understanding of collaborative learning can be interpreted analogous to what Schmidt (1994) has termed cooperative work: Interdependency in work. Although cooperative work is a collective phenomenon of work, each action is often conducted by an individual actor directed towards a work task. This means that most work tasks are carried out by an individual, but the peer-actors are mutually interdependent in their work (*ibid.*) in the sense that they need to coordinate and articulate their actions to get the whole work done. In collaborative arrangements, there is a web of actions; informal and formal information exchange, individual (and sometimes collective) work tasks are discussed, handled, solved, etc. All of these actions are more or less interwoven and incorporated, dependent of the current situation.

3.2. The relationship between tool and medium

The dialectical contradiction between (problem-oriented) work tasks and cooperation, are considered fundamental to understand how a computer application should mediate the web of human actions in a collaborative learning community. The dynamic interplay between the web of human actions, implies that a computer application has different roles in different situations. In some situations the application has the mediating role between an individual and her peer-students. In other situations the application has the mediating role between the individual and her work tasks. Thus, the application has to be understood analogous—and as a support to—the contradiction between cooperation and work tasks. The computer application can not simply be understood as a medium for communication (cf. Maaß and Oberquellé, 1990)—information transmission—but as a medium for inter-human interactions and articulation of individual work. The application should also be understood as a tool to

allow the student to concentrate on the goal of her work tasks (c. f. e. g. Ehn, 1988), Maaß and Oberquellé, 1990).

The computer application should then be understood in terms of a dialectical contradiction, to support the whole phenomenon of CSCdistanceL. The relationship between the two rectangles in figure 1 (illustrated with the vertical arrow) illustrates how an application is incorporated in a web of human actions in collaborative learning. Thus, the analytical framework for evaluation—and further for design—of computer applications is understood as a dynamic interplay between aspects of the computer application (tool and medium) and aspects of collaborative learning (problem oriented work tasks and cooperation).

4. Final Remarks

The expanding usage of e-mail, WorldWideWeb, computer conferencing systems, group-ware, etc., has reached the educational part of our society. But changes in how learning is organised put new or other requirements to the applications as a consequence of their usage in 'real situations' outside the laboratories.

The analytical framework presented in this paper can be applied to evaluate what applications that are most useful in what learning situations. The framework can also be used as a means for designing new applications for collaborative learning.

The dialectical contradiction between work task and cooperation, indicates that if a computer application should mediate collaborative learning, it should mediate human actions directed towards *both* individual work tasks and cooperation. If the application mediates actions related to only one of these aspects, it does not mediate the whole collaborative learning process. For example, if a computer application only mediates actions directed towards cooperation—and only *some* aspect of it—it does not mediate the whole process of collaboration.

The asynchronous and text-based communication applications available for the target group of most distance learning institutions—'the home-students'—represents *some* premises for cooperation: Distribution, transmission and presentation of information in written form. A learning situation in which individual and independent production of written contributions and distribution of these are emphasised, the applications do not cause a crucial conflicting frame. Interdependency in work is not emphasised. This factor is however crucial in learning situations in which a *shared environment* for recognition and experience is fundamental. In such situations, the available applications do only mediate a limited part of the whole process of creating and manipulating a collaborative community.

Computer applications supporting the dynamic inter-play between various human actions of collaboration are on their way out of the laboratories. However, these applications are not technical and economical available for the adult working people of society—having the need to take part in a collaborative learning community from the places most convenient for them—from their homes. The further challenge is to develop applications supporting *their needs*.

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Author's Address

Annita Fjuk: Department of Informatics (University of Oslo), Box 1080 Blindern, N-0316 Oslo, Norway
E-mail: annita@ifi.uio.no.