

Intellectual Amplification through Reflection and Didactic Change in Distributed Collaborative Learning

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The agreed educational expectation to Distributed CSCL is the establishment of flexible, collaborative and interactive learning processes of good quality (Kaye, 1994). Achieving peer interaction in distributed CSCL, however, has so far proven to be a mixed and ambiguous affair (Fjuk, 1998; Sorensen, 1997b & 1998).

Within Distributed CSCL-research it is generally acknowledged, that new insights into the communicative learning conditions of the virtual environments, together with new didactic methods, have to be developed (Koschmann, 1996; Pea, 1994). Moreover, much research points to human interaction and communication as the key elements to unlocking the interactive learning potential of distributed CSCL (Dillenbourgh et al., 1995). In other words, we need more stringent analytical approaches, which relate the communicative qualities of the virtual context, to qualities of the learning process.

This paper compares the problem of stimulating online interaction to the lack of understanding among designers and instructors of the specific dialogical conditions of virtual environments. It discusses, from the perspective of the learning principles of Gregory Bateson (1973), in what sense the specific dialogical conditions and qualities of virtual environments may support learning. It also deals with the challenge of how - under different dialogical conditions - to understand the need for didactic and instructional change in order to enhance interaction and intellectual amplification in asynchronous distributed CSCL.

Keywords: conceptual change, web, scaffolding

1. Introduction

The agreed educational expectation within Distributed CSCL (1) is design and delivery of flexible collaborative and interactive learning processes of good quality (Kaye, 1994). Nevertheless, this expectation has so far proven to be an ambiguous and mixed affair (Sorensen, 1998), and the very problem of achieving peer interaction in distributed CSCL designs has manifested itself as a recurrent problem, very complex to approach and comprehend. Generally within CSCL-research, the problem of achieving interaction in distributed collaborative learning in virtual environments is widely accepted to be a problem situated in the interrelations and lack of proper integration between pedagogy,

organization and technology (Bates, 1995). Concrete experiences, however, often continue, on the one hand, to blame technology as being insufficient, and, on the other hand, to emphasize that face-to-face learning processes are - in many aspects - of higher learning quality than distributed learning processes in virtual environments. Within CSCL-research it is acknowledged that new insights into the interactive learning conditions of virtual environments have to be born, together with new, corresponding instructional designs and didactic methods (Koschmann, 1996; Pea, 1994). It is also a growing awareness that it is the phenomenon of human interaction and communication which in some way or other is the key element to unlocking the interactive learning potential of CSCL (Dillenbourg et al., 1995).

In any assessment of learning qualities of distributed CSCL a certain theoretical view on learning is implied. In general in CSCL, we assume the general principles of collaborative learning theory (Harasim, 1990; Sorensen, 1996 & 1997b). But these principles are only vaguely defined in the continuum between theory and practice and do not appear focused enough to function as optic for an analysis of learning qualities in the virtual environment. We need more stringent analytical approaches, which relate communicative potential and qualities of the virtual CMC context, to qualities of the learning process.

This paper assumes the problem of spawning interaction as being related to a lack of understanding among designers and instructors of the specific dialogical conditions forming the fundamental conditions of collaborative learning through interaction and reflection in distributed virtual environments. Based on this assumption the paper discusses, from the perspective of central learning principles of Gregory Bateson (1973), in what sense the dialogical conditions of virtual environments differ from face-to-face conditions. It also deals with the challenge of how - within these different dialogical conditions - we may understand the challenge of instruction and need for new didactic genres and roles in order to enhance interaction and quality in online learning processes. The following sections point out the problems related to the dialogical paradigm of face-to-face learning which underline many distributed CSCL designs. Section 2 presents a new dialogical paradigm as well as three basic principles for design of distributed collaborative learning. In section 3 some resulting new didactic techniques are discussed. The discussion of the paper suggests, in principle, that the symbolic representational nature of virtual collaborative learning environments as well as the meta-communicative instructional strategies of weaving may be viewed as rich sources increasing intellectual amplification in online learning.

2. The missing link: A new dialogical paradigm

When designing distributed collaborative learning processes, a focus on how to stimulate peer interaction is essential (Harasim, 1989; Sorensen, 1993). And with such focus, we are hitting exactly the core potential of asynchronous virtual environments, regardless of whether they are client-server facilities or based on the Web. However, so far we have been using our knowledge about the conditions of face-to-face dialogues and the way they are stimulated, when trying to design and create support for distributed interaction in

virtual environments (Sorensen, 1997b). In other words, we have in design and management of asynchronous distributed CSCL processes worked from the assumption, that the conditions of online dialogues are the same as for face-to-face dialogues. This problematic assumption may graphically be mirrored as follows (fig. 1):

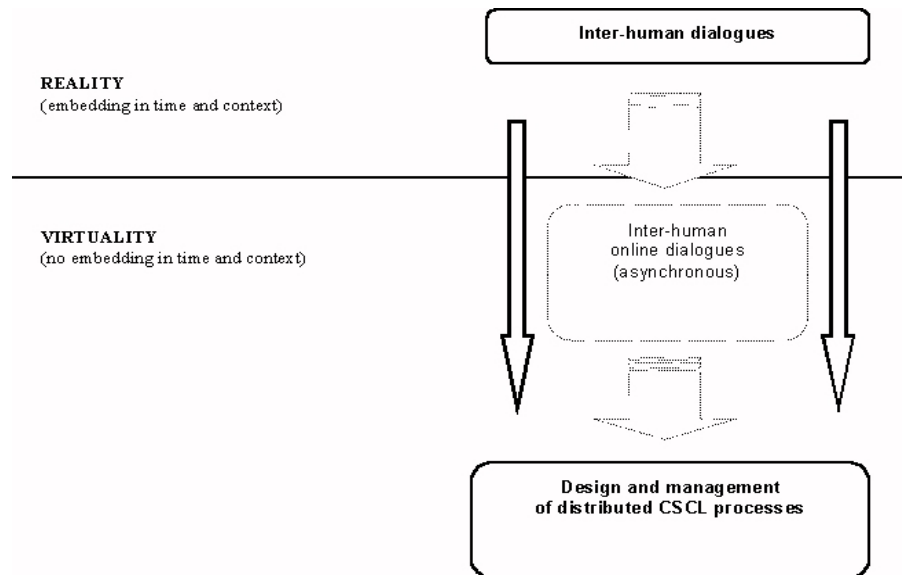


Fig. 1

The two thin arrows in fig. 1 mirror the relation in thinking behind the majority of cases of distributed CSCL. The white arrows indicate that the thinking behind design and management of distributed CSCL- before even considering processes of learning - instead must pass through a deeper understanding of asynchronous online dialogue. We need to understand what happens to inter-human online dialogues that are no longer routed and embedded in a physical time and context. Such research must be central when considering the fundamental focus within CSCL on dialogue and interaction in learning (Harasim, 1989; Sorensen, 1997a).

As mentioned earlier, it is my hypothesis that this is an inherent problem of many designs of distributed CSCL, which uncritically assume the understanding and premises of face-to-face interaction in CL. This assumption exerts an influence on the failure or success in establishing online interaction. Moreover, it also influences the way we understand and apply the role and tasks of the online instructor (Sorensen, 1999). Although sparse in terms of quantity, some cases of research (Eklundh, 1986; Sorensen, 1993) have approached the challenge of understanding the specific conditions and premises of online dialogue. Sorensen (1993) analyzed large quantities of electronic dialogues from a linguistic perspective and reported of four basic principles of online dialogues (Sorensen 1993). But, basically, what we need are different analytical approaches, which do not only look at the online dialogues themselves, but relate the communicative potential and qualities of the virtual environment to qualities of the learning process. Such an approach may be inspired by some general principles of the learning theoretical framework of Gregory Bateson (1973).

3. Theoretical perspective: Communication and learning in the light of Bateson

Although Bateson is not a linguist, he works from the basic assumption known from the field of semiotics of "communication as a multi-semiotic phenomenon" (Sorensen, 1997b), viewing all signs in a communication (verbal and non-verbal) as communicators that play a role in creating and forming the communicative message. In his understanding, the meta-communicative context is essential in learning, being active in forming the communicative message. In Bateson's understanding all types of learning are phenomena of communication and that therefore learning must, in some basic way, be subject to the same rules that apply to communication (Bateson, 1973). One of the very central ideas in Bateson's theory is that incidents of learning - being basically communicative in their nature - unfold as meta-communicative movements in different levels of reflection (2) or communicative contexts (3), in a continuum distended by "no reflection" on the one hand and "several levels of reflection" on the other (fig. 2):

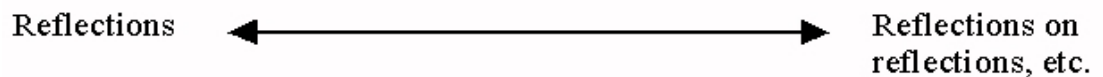


Fig. 2

Bateson views meta-reflection as, both a necessary precondition as well as a result of learning. His understanding of the learning phenomenon as processes of reflection and meta-communication may be mirrored as follows (fig. 3):

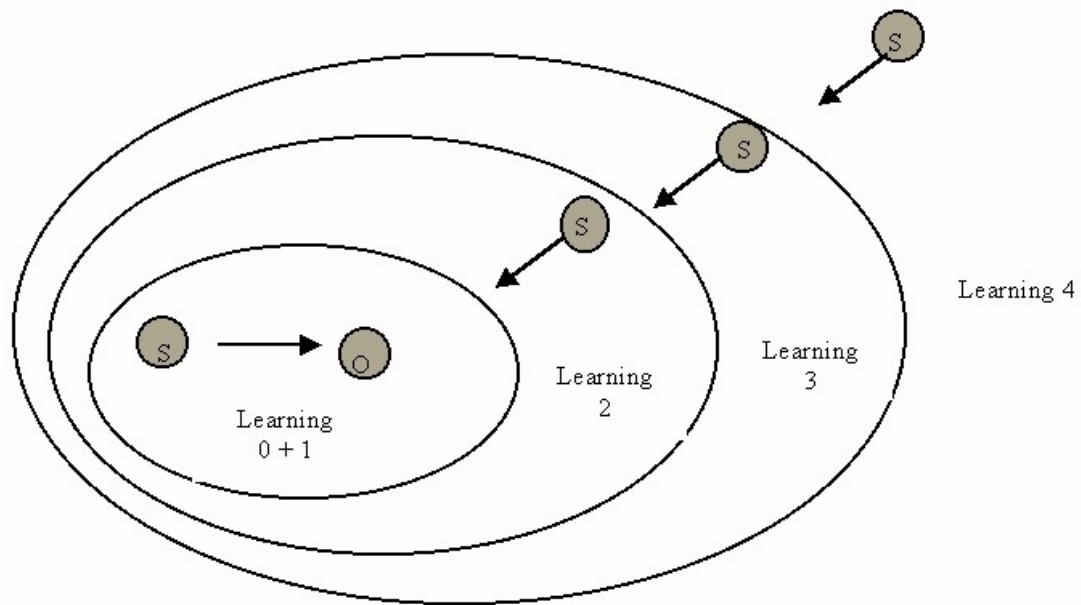


Fig. 3

Bateson operates in his learning model (fig. 3) with learning as transcendence of levels of reflection taking place on the basis of related layers of context (meta-communication). In learning 0 + 1 there is a direct relationship between the learner/subject (S) and object which has to be learned (O). At this point in learning there is no reflection over the learning process, but the fundament for reflection is developed. We could say that there is a more or less random testing of possibilities.

Learning level 2 is characterized by an indirect relationship between the learner (S) and the object (O), as the learner uses reflection as one of the means in his learning process. At this level there is a systematic reflection on how to solve a problem, and the learner is conscious about the fact that he/she is learning. He/she is consciously tied to the situated conditions (in a wide sense) and actively using, what he/she has learned at other other levels.

At learning level 3 there is a relationship of reflection, in relation to reflection in learning. At this level the learner has a reflective attitude to how he/she him/her-self approaches learning. This level of learning usually happens outside concrete contexts.

Level 4 is difficult to handle. Much interpretation of Bateson sees learning at this level as the momentary aha-experience in which we may sense faintly the whole connection of something. Others interpretations add that this is the level of learning or insight which may also bring a conscious opposition in learner, as a consequence of having achieved the problem-penetrating insight into a problem.

In sum, we could say that the general learning principle in the model of Bateson is that "you should always relate yourself to yourself, while you relate to something", and that the learning achieved changes all the time, because the frame (or context) within which it happens, changes.

4. Principles of Distributed CSCL: From reality to virtuality

With respect to the role of "reflection" in learning, Engeström (1987) points out that reflection over the learning process is essential, if learning is to develop and expand in depth and in width (Engeström, 1987). When we move from the physical reality to the virtual reality we are subject to a change in context and to a change of principles and premises of being and acting through the insertion of a meta-level of representation which creates a reflective distance. Looking more closely at what happens to our "ontological" conditions for action and interaction when moving to the asynchronous, distributed virtual world, we find 3 basic principles:

4.1 From appearance (being) to representativity (signs of being)

It is only through signs and symbols produced by a learner, that the learner is "present" in the shared virtual environment. Likewise, his/her social relations, i.e. any action (communicative or non-communicative) he/she may take, is not carried out directly, but through the insertion of a meta-communicative level, i.e. the manipulation of symbols or representations (Foucault, 1970; Sorensen, 1997b). Moreover, it is not only the learner's actions and interactions which take place through representative signs (e.g. the written sign). Also, the signs and communication from his/her context(s) - a concept of great complexity for the distributed learner (Sorensen, 1997) - has, through processes of reflection - to be transformed into verbal language and communicated in language, together with the language games themselves of the interaction with other people. The only part of the learning context, which is shared, is the virtual environment as well as the context of the language games constructed through the interaction with other learners. The view that "context" is an important factor in communication, is not new. The linguist, Roman Jakobsen, in his model of communication talks about "the referential function to the context" (Ricouer 1978, p. 222), and the American philosopher, Peirce, from the perspective of semiotics, focuses on the indexical relationship of any sign to the embedding world (Suchman, 1987). Also, the HCI-researcher Lucy Suchman is concerned with the role of context and states that the significance of a linguistic expression on some actual location lies in its relationship to circumstances (Suchman, 1987). Finally, also Bateson uses the term "context" to describe the (not materialistic) situational conditions - that are communicatively effective in creating meaning - in which a message, an incident or a behavior occurs (Bateson, 1973).

4.2 From primarily being involved in interaction to primarily reflecting in interaction

As mentioned in the previous paragraph, the move of learning processes to a distributed virtual symbolic environment means the insertion of a meta-communicative level in all of the learner's actions and interactions. This insertion of a meta-communicative level in learning actions and interactions creates "distance" between the acting subject (the

learner) and the object (the intended action or interaction). Processes of reflection not only imply distance, they are preconditioned by distance. Consequently, we may conclude that the virtual universe - contrary to the physical world in which involvement may be viewed as primary to reflection (Heidegger, 1986) - provides a context and an "ontology" in which reflection is primary to involvement. The fact that reflective processes (i.e. distance) are primary to involvement in distributed virtual environments may very well also explain the frequent experience, that transferring collaborative learning processes to virtual environments usually uncovers and makes visible (to a much higher extent than face-to-face processes) features of the learner's communicative acts. The reflective character of our actions in the virtual space implies the distance, which causes us to acknowledge them. At the practical level, the learner experiences the enlarged need for reflection in the virtual environment, e.g. when he/she makes the simple communicative act of composing a message. Before submitting the message, the learner is asked to reflect on the content of his/her message and, through reflective engagement at a meta-communicative level, decide on a descriptive title in relation to the content of the message.

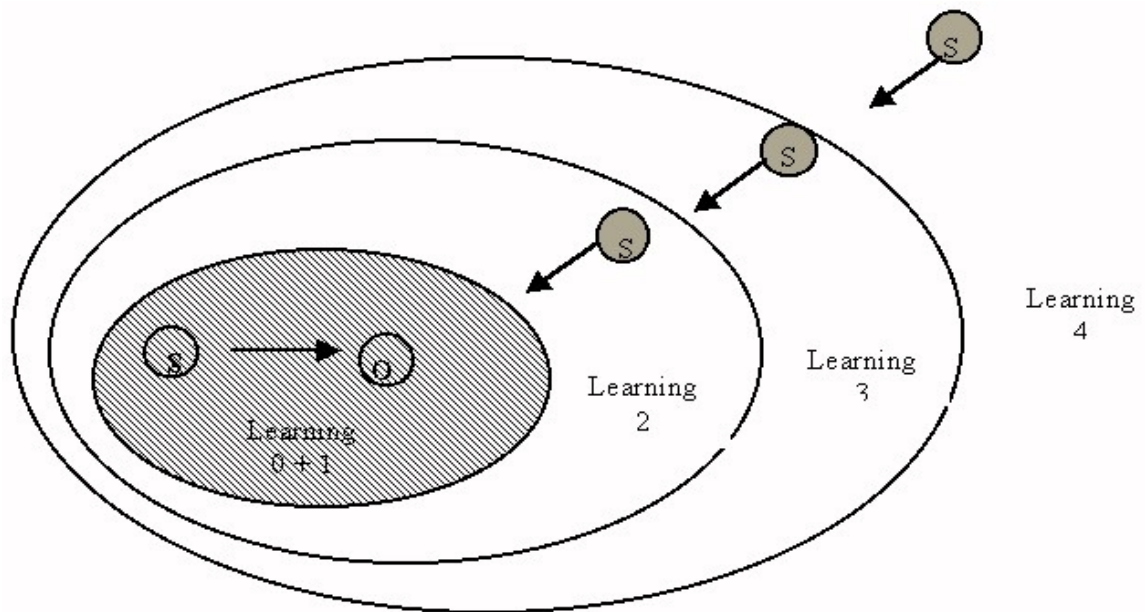


Fig. 4

Summing up we may conclude that the virtual environment enhances processes of reflection (fig. 4). More specifically, if we relate this and the fact that even at the first level of learner actions in the virtual environments there is reflection involved, we may more generally conclude that learning processes unfolding in virtual environments are initiated at a higher reflective level (level 2) of learning (fig. 4) than physical learning processes that unfold primarily as involved processes in relation to the learning content.

4.3 From involved speech to reflective writing

From the theoretical view of Bateson, the insertion of a symbolic level through the use of the written sign in learning actions and interactions also has a clear learning value (Sorensen, 1999). As such, the move from dialogically composed speech to monologically composed writing is an environmental change which also contribute to draw and define the basic reflective conditions for learning processes in distributed virtual environments. Not only does it support increased reflection and thinking at the shared collaborative and interactive level, it also constitutes a kind of tool for individual, intellectual amplification. The process of writing something down causes a distance to open itself between the thought and the thinker. Much research and literature acknowledges this view on writing. E.g. Johansen (1998) states, that the linguistic forms are the forms of thought and that writing is the technology of thinking (Johansen, 1998). Writing is said to be thinking made tangible and that the road to clearer understanding of one's thoughts is traveled on paper. It is often through the search for words to express ideas that we discover what we think. The need for explicitation that is implied in writing also supports learning processes when viewed, as in the case of Bateson, as transcendence of reflective levels in the continuum between no reflection and reflections on reflections on reflections.

5. A need for didactic change

The very different learning conditions, provided through the new dialogical paradigm discussed in the previous paragraph, may be part of the reason for the experienced lack of success in stimulating online interaction in asynchronous distributed collaborative learning. Most likely these conditions require a review of mechanisms related to instructional methods used so far for online learning processes; methods which are developed within face-to-face instruction, i.e. on the basis of a fundamentally different dialogical paradigm. The new dialogical conditions create a need for didactic change related to design of collaborative learning processes, to teaching methods within collaborative learning, and to design and establishment of virtual environments for collaborative learning. Some central instructional CSCL concepts and ideas may have to be reviewed, broadened, or redefined:

5.1 Scaffolding

Traditionally, the concept of **scaffolding** (Bruner, 1966) is a concept implying the perspective of the tutor or instructor. It denotes the role of the most experienced party (i.e. the tutor or instructor) in the collaborative learning dialogue. The most experienced person as being the one judging in which ways the problem may be decomposed to suit the zone of proximal development (Vygotsky, 1978) in the learner. In other words, traditionally scaffolding is a tool or technique to be employed by the instructor - or to support the role of the instructor -, rather than a mechanism to directly support the collaborative processes between the learners themselves. Viewed from the new virtual dialogical paradigm of meta-communication and meta-reflection as these appear through the glasses of Bateson, scaffolding should not primarily be related to the decomposition of learning content. Rather, as transcendence of learning levels appears to be the key in

learning, it should be directed towards supporting the learners' navigation through meta-communicative levels. - The idea that instruction in online learning interaction should be concerned with meta-communicative structures, has earlier - on different grounds - been introduced through his concept of "weaving" by Feenberg (1989).

5.2 Genuine interdependence

Contrary to the traditional idea of scaffolding, the concept of **genuine interdependence** (Salomon, 1995) departs from the learners' perspective. It implies supporting the zone of proximal development in the individual learner through peer interaction amongst the learners themselves. It concerns the need to share necessary information and concepts, the pooling of different complementary roles among the group, and the pooling together of minds (Salomon, 1995). In the asynchronous distributed virtual learning environment the concept of genuine interdependence among the group must also, from the perspective of Bateson, be concerned with the meta-communicative levels of the interaction and collaboration of the group. In this case a responsibility of the students themselves, and perhaps a very important learning process to precede other types of virtual collaborative learning processes.

5.3 Awareness

Finally, the idea of **awareness** (Gutwin et al., 1995) as denoting the "up-to-the-minute knowledge a student requires about other students' interactions with the shared workspace" (Gutwin et al., 1995, pp.1). This concept denotes four types of awareness in the learners that are used in a collaborative experience: social awareness, task awareness, concept awareness, and workspace awareness. The term "awareness" in collaborative learning connotes reflection and meta-processes. As such, the concept seems very well suited to describe important issues, also from a Batesonian perspective. To support awareness in all of these areas is, however, a challenge that is likely to affect, not only instruction, scaffolding, and didactic elements of distributed learning processes, but also the actual design and construction of virtual environments for asynchronous distributed collaborative learning.

6. Conclusion

This paper has dealt with the learning qualities of asynchronous distributed collaborative learning processes in virtual environments. From the perspective of the learning theoretical position of Gregory Bateson the paper has attempted to establish principles describing to what extent and in what sense virtual learning processes possess learning qualities hitherto unknown from face-to-face learning situation. It seems relevant, on the basis of this initial theoretical exploration, to conclude that asynchronous learning processes - in as far as processes of reflection are viewed to be central expressions of learning - receive a special support in distributed virtual environments. In other words, through the insertion of a meta-communicative layer of context, virtual environments seem to support processes of increased reflection in learning. Furthermore, when learning processes move up the reflection ladder, we need to provide meta-communicative weaving techniques and to support meta-communicative structures in learning. The fact,

that distributed collaborative learning processes unfold on the basis of a different dialogical paradigm than familiar face-to-face processes, indicate, that we meet with requests to review existing instructional techniques and to incorporate new didactic methods.

7. Future perspectives

The emphasis - from the perspective of Bateson - on reflective processes in learning should, however, not make us forget the important dimension of practice. It is beyond any doubt that virtual spaces and virtual learning environments must reinforce research which aims at finding ways to implement practice in the virtual universe of learning, perhaps through the implementation of collaborative tools (e.g. white boards; shared documents; etc.) or through electronic simulation techniques. This paper has been dealing theoretically with problems and concepts of asynchronous distributed collaborative learning. The challenge ahead is to investigate, more empirically, how - and to what extent - the principles described are manifested in practice.

Notes

1. "Distributed CSCL": a distance learning process unfolding in virtual environments (Web or CMC-software), where the main part of the process takes place asynchronously (in relation to time and place) over the Web or CMC system
2. Mads Hermansen has in his book "From the Horizon of Learning" introduced the interpretation of the various learning levels of Bateson as corresponding to levels and meta-levels of reflection in learning (Hermansen, 1996).
3. Bateson uses the term "context" to describe the (not materialistic) situational conditions - that are communicatively effective in creating meaning - in which a message, an incident or a behavior occur (Bateson, 1973).

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