The Role of Knowledge in Computer Collaborative Learning Research

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Abstract

The aim of this paper is to describe the most significant theoretical frameworks concerning Computer Collaborative Learning Research (CSCL) on the light of Web 2.0 supports. The term Web 2.0 embraces a range of 'social' technologies and tools that enable users to create, publish and share digital contents within both new and existing social networks. Technologies such as blogs, wikis, podcasts and file sharing services are increasingly being used to support learning and teaching within the higher education sector (see Hughes, 2009; Kennedy et al., 2009). The implications of collaborative interactions within the socio-constructivism approach are examined. Harasim (2012) defines online collaborative learning as characterized by interactive group knowledge-building processes. This aspect implies that students participate actively by monitoring different levels of learning while they are collaborating with teacher and pairs. The computer supported collaborative learning research (CSCL) community focus on the role of technology considered as a tool through which students and teacher make sense of the world and negotiate meaning. Many researches about CSCL environments concerns the role of teacher in allowing social and significant interactions among all group members. Three factors drive the change from teacher-centered to centered learning approach, the shift from individual to group learning and from contiguous to asynchronous distributed learning groups. All of these aspects imply changes in educational institutions based on social construction of knowledge and competence-based learning. Through the years of competence based approaches have proved to be a critical tool in human resources management and computer collaborative research.

Keywords: social- interaction, Collaborative Learning Research, constructivism

Introduction

Literature review: from cognitive to constructivist perspectives

Using technology tools can reinforce the acquisition of information through multiple modes of knowledge representation and comprehension. This improves learning

outcomes by contributing to intellectual growth and critical thinking (Pena-Shaff and Nicholls, 2004). There are various reasons for emerging interest in collaborative learning. The first reason is that it is a general trend in the area of Human Computer Interaction (HCI) in which computer supported work and learning is situated. The new area, referred as "ubiquitous" or "pervasive" computing, is a logical extension of HCI research. Research in this area is derived from recent advancements in three interrelated field:

- tangible user interfaces which involves direct contact of hand and body

- ubiquitous computing in which the person has multiple devices available in the environment and computational power is available everywhere and augmented reality is the result of overlapping and adding digital information to real objects.

In these complex learning environments, the attainment of task is based on active construction of knowledge: students are encouraged to exchange ideas, share perspective and use previous knowledge experiences to solve authentic problems (Kaplan et al. 2008, Dillenbourgh, 2010). Researchers working on collaborative learning have recently turned their attention to the interdisciplinary study of the dynamics of communicative interactions (Resnick et alt. 1997). This shift of emphasis is linked to the recognition that, without powerful theories and specific modes of cooperative learning, the ecognition of interactive learning mechanisms will be essentially blind.

Research on computer collaborative learning emerged as a field from the 1980s onwards, from two related research trends. Firstly, researchers working in 'mainstream' cognitive psychology and information-processing models of individual reasoning, problem solving and learning, began to turn their attention to learning in groups, largely motivated by the possibility and necessity of understanding how students worked together with and around computers (Dillenbourg et altr 2009).

A second strand concerned the attempt to extend Piaget's theories of development focused on the individual to learning in social interaction.) Across these approaches, the development of knowledge and learning is viewed as cognitive action involving construction of mental representation of reality. The constructivist approach views knowledge as an entity mentally constructed through actions and experiences. Knowledge is actively constructed by the interaction between the learner and external objects through adaptation of and experiential world. Consequently, through the establishment of flexible mental constructs (Glaserfeld, 2013; Wheatley, 1993) learning occurs. The meaning of the external world according to constructivism is socially negotiated. Thus, external reality is likely to be perceived differently by different learners, and it is through social negotiation that common meaning is constructed. To enhance learning, the environment should be constructed in a manner that enhances a recurrent process of adaptation to learner's mental schema through significant interactions in a social contest. Constructivism implies situated cognition in authentic activities (Brown, Collins, & Duguid, 2000). In such situations,

learners are given opportunities to draw from their own experiences interpretations and situational relevance. Reflection in online environments encourages learners to shift beyond perception to deeper and more insightful meaning making. Meaning making, according to constructivism, is the goal of learning processes; it requires articulation and reflection on what we know. Individual reflection is an important strategy that may enhance the development of insight, cognitive awareness and critical thinking.

Theoretical framework of Computer–Supported Collaborative Learning and related research field

The field of Computer- Supported Collaborative Learning (CSCL) appears as a specialized direction in the area of communication mediated by technologies. The principal focus of CSCL research is on ways in which collaborative learning supported by the technology can enhance peer interaction in groups and ways in which collaboration and technologies facilitates sharing of knowledge and expertise among different members of community.

The socio-constructivist perspective focuses primarily on human action and interaction in order to understand pedagogical practices: the actions considered as socio-biological dynamic are triggered by physical and symbolic exchanges. Biological functions or neural structures subjacent to all human behavior, including learning and configurations of meaning work together. The structural-biological dimensions of knower take into account the social-cultural environment the technologies are embodied. This aspect recursively shapes the structure of CSCL environments. The approach of socio-cognition goes beyond the idea that knowledge acquisition is a only a treatment of representational information' symbols. Cognition is productive action that promotes structural changes in a Knowledge system by creating new developments and enrichments.

A promising axis of work within CSCL is the scaffolding of productive interactions between learners by specifying in detail the collaboration in scenario scripts considered as set of instructions specifying how the members of the group should interact and collaborate to solve a particular problem.

It's been suggested that to understand the essence of interactivity, one might look back in history to a time before computers and technology in a time when interactive learning was exemplified by the Socratic dialogue between tutors and students. These interactions are dynamics, reciprocal because during a communicative event each part could adapt to the others. Understanding action holistically implies the consideration of logic as the procedures subjacent to meanings and the contents that are the meanings underlining procedures. The study of the dynamics of behaviors depend on the variability of human psychogenetic traits. The cognitive structures that result from the organic brain processes are necessary but not sufficient to explain the emergence of the action in a situation characterized as pedagogical communication. It is through the creative paths of language that cognition unfolds because human

actions are not mechanisms that can isolated from the living contexts of the knowing. The interaction with the world implies dynamic symbolic flexibilities that constitute the logical dimensions as well as the semiotic dimensions of knowledge : neuronal system results from the interaction between the subject and the world is an intentional process in which subject all attempts to make sense to content to solve both well and ill- defined problems that require the use of procedures at semiotic levels of meanings.

Success of computer collaborative learning research

Success of collaborative learning activities requires generation, transfert and understanding of knowledge that makes collaboration as an essential and highly valued process. Interaction is constructive if it leads to the co- construction or building of meaning, understanding the solution of a problem. An interaction can be constructive to the extent that it contributes to cooperative goal-oriented activities.

Research focused on the analysis of collaborative activities in task-oriented situations (Olson et alt, 2008; Carter & Storrosten, 1992; Badke-Schaub et, 2007; Burkhardt, Détienne, Moutsingua-Mpaga, Perron,Leclercq & Safin, 2008; Détienne, Burkhardt, Hébert & Perron, 2008) has highlighted collaborative processes along different dimensions. They can be classified according to their orientation toward design-task processes, group processes or communication processes. Firstly, collaboration concerns the activities related to design activities that imply the elaboration or the search of new solutions and evaluation activities, supported by argumentation and negotiation mechanisms.

These content-oriented activities reveal how the group attain the tasks by sharing and co-elaborating knowledge through the comparison of participants' different perspectives and negotiation of knowledge.

Secondly, collaboration concerns group management activities such as project management and coordination activities that allow the processes of planning an monitoring of tasks.

Thirdly, communication processes are highly important to ensure the construction of a common reference by the groups. The establishment of common ground is a collaborative process (Clark & Brennan, 1991) by which the participants mutually establish what they know, so that task-oriented activities can proceed. Grounding is linked to sharing of information through the representation of the environment, artefacts, the interaction and supposed "pre-existing" shared knowledge. Finally, research on collaboration processes (Baker, Détienne, Lund &Séjourné, 2003; Barcellini, Détienne, Burkhardt & Sack, 2008) considers the roles of participants according to communication, group management and task management and the balance between these roles and learner-centered collaborative approaches. Learner-centered collaborative learning enhance reflexive awareness that facilitate knowledge construction.

Social computing application for learning

Social computing applications allow users to communicate and collaborate in diverse ways and in a variety of media, which also helps learners to act together and to build knowledge bases that fit the specific needs. The most common social computing applications relevant for learning will be presented, indicating their potential for enhancing education and training and outlining some obstacles and threats to the implementation in learning settings.

Social computing applications lend themselves to being used as research and knowledge management tools. Tagging and bookmarking services in particular allow teachers and learners to build individual or collective collections of resources, share personally classified bookmarks, recommend, comment and rate sources, and set up reading and resource lists. Tools such as blogs can be used among a group of learners, using their individual blogs, to build up a corpus of interrelated knowledge via posts and comments.

In these and many further cases, social computing tools are used to gather the collective work of a group of students or teachers, empowering the individual participants to become authors of content, but at the same time integrating them into a network of peer reflection and support.

The students appreciate the ease of building up a substantial knowledge base and the collaborative mode of operation. Research indicates furthermore that university students are embracing social computing tools on their own account to support their research network building, personalizing their knowledge and resource management.

In all of these cases, social computing tools are used primarily to replicate reality, tying learning experiences and procedures back to the nature of the subject at study and professional reality. Thus, social computing can on the one hand contribute to overcoming the discrepancies between theoretical training and professional practice by supplying innovative ways of integrating practice into training.

Social computing tools are often employed to make learning material more readily available to students by promoting individual knowledge management strategies, by supplying new research network building tools and allowing for the establishment of personalised knowledge repositories. Research findings indicate that these Learning 2.0 strategies can also contribute to improving learning outcomes.

Conclusion

The relationship to the everyday technologies is constantly evolving. The present study is significant in its attempts to draw on different theories to investigate the theoretical framework of Computer Collaborative Learning. The findings indicate that facilitating discourse, reflective thinking, assessment and connectedness contribute to interactions. From the practical perspective, the present study suggests that using

multiple medium of instruction enriches the communication context and leads to enhanced learning.

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