Collaborative Writing in E-Learning Environments

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INTRODUCTION

The writing of a collaborative document can be a constructive experience if the members of a group agree in sharing points view and knowledge in benefit of the final goal. In a true collaborative environment, each contributor has an equal ability to add, edit, and remove text. The writing process becomes a recursive task, where each change prompts others to make more changes. Therefore, collaborative writing can be more than representation and organization of ideas; it can help learning process by making participants build knowledge through group interaction. For that reason, during the writing process, participants must be encouraged to interact with others, sharing knowledge and discussing the theme in such way both individual and group learning can be assured. A supplementary benefit is the production of documents "enriched by the collective knowledge," reflecting the participants contributions on the subject matter.

The collaborative writing is a four-step process:

a. **Brainstorming:** Survey of suggestions and ideas of each participant about the theme
b. **Planning and Organization of Ideas:** Suggestions are stored, classified and organized, serving as database to later phases
c. **Composition:** Each participant edits a complete text or is responsible for one of its parts, using the database
d. **Review:** Texts edited by each participant are reviewed in order to conclude document

Some approaches can be adopted for setting up the Composition and Review phases of collaborative writing tasks: Each participants writes a complete text and the group argue the ideas contained, until they find a consensus; or each participants is responsible for one part of the document, using the ideas generated by all and later a single text is composed joining the parts; or the text can all be broken up in parts assigned for the participants, being constructed at the same time for the whole group. Any form of setting up this task must adopt a politics of annotations, comments and suggestions, in such way to stimulate interaction among participants.

We observed in literature that collaborative text editors are not focused on educational activities, thus they do not incorporate functionality to make participants discuss and interact while they build texts. The priority is document visualization and change notification. Alliance (Decouchant, Enríquez, & González, 1999) assigns roles and access rights to the various fragments of documents, while in IRIS (Koch & Koch, 2000) and PENCACOLAS (González et al., 1997), all group members write on the full text.

In this article, we review the main concepts, theories and supporting tools for collaborative writing and present and discuss our tool called EdiTex. Editex supports the following activities involved in coauthoring Edition, Perception, Coordination, Interaction, and Storage. A text has an author and an identification number, besides it is composed of fragments, which can be paragraphs, phrases, sections, chapters, and these comments can be associated to each fragment.

We assessed EdiTex in two case studies and the results point out that it helped the students in the task of writing an essay collaboratively. Even so, the general results showed that group composition, task nature, context and infrastructure for communication are key

points for successful collaboration in groupware. In all case studies, the tasks performed were similar; all of them involving the collective production of short texts, despite the work processes have been different. The groups' members had similar academic formation, and anyway, we observed great differences in work dynamics. Individual characteristics have strong influence; therefore the environments must stimulate, as well as exploit individualities for the success of the work.

EDITEX: A COLLABORATIVE WRITING TOOL

We developed a tool for collaborative writing called EdiText (Santoro, Borges, & Santos, 2000, 2002, 2003). It was designed and implemented regarding the problems related to co-authorship in Computer-Supported Collaborative Learning environments (Bourguin & Derycke, 2001; George & Leroux, 2001; Tiessen & Ward, 1999; Wan & Johnson, 1994).

Many projects developed in collaborative learning environments involve document co-authorship. The definition of roles can contribute to stimulate interaction, ideas sharing and knowledge construction. It is also necessary to define the rules of interdependence in the accomplishment of the task to guarantee that this will be carried through in a collaborative way.

The editing activity must be described according to following criteria:

a. **Objective:** The activity aims to the coauthoring of a document that can contain texts, graphics and figures, for a group of students, in way that, at the ending of the activity, the students have acquired knowledge on the document subject. In addition, they must put into practice the interchange of information to reach the objective.

b. **Roles:** The writing task in group can involve: coordinator, writer and publisher.

c. **Products:** The expected product is a document that can contain texts, figures, and graphics.

d. **Interdependence elements:** The final product is presented by the group and not in separate parts of each one of its members.

e. **Interdependence rules:** Each member of the group must be responsible for the document as a whole, being able to edit one or more of its parts individually. All members must contribute with

suggestions and comments on the work. Individuals can use personal experience or specific knowledge to enrich the work.

The supporting tool must consider those aspects. The solution is a list of requirements that can be implemented through the addition of functionality. The requirements deal with the following issues: Edition, Perception, Coordination, Interaction, and Storage.

a. **Edition:** The participant edits the document asynchronously, or either, each participant can work independently of the presence of other group members, at the same moment. The document must be structuralized in fragments defined by the group. Every fragment must be associated to a member of the group that is responsible for its edition. A mechanism for annotations and comments on the fragments must be available.

b. **Awareness:** All group members must have the possibility of to visualize the full document. Every group members must have the possibility to get information on his responsibilities on the fragments. The group members must receive notification about changes made in any part of the document.

c. **Coordination of the activity:** Roles must be assigned, with different responsibilities on each fragment. Roles interchanges must be possible during the task execution. All members must have the same chances to contribute in the activity.

d. **Interaction:** Messages exchange among the members of the group must be possible, aiming at discussion of ideas on the document. Discussions must be registered.

e. **Storage of the document:** Storing versions of the document must be possible. Participants must save the document when the activity is finished. Participant can access previous versions of the document with the respective annotations.

The requirements specified had been extracted from the main works in collaborative writing found in literature (Decouchant, Enriquez, & González, 1999; Koch & Koch, 1998; Wan & Johnson, 1994). EditEx implemented the following:

a. **Edition:** Synchronous and asynchronous edition

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