Supporting Collaboration and Adaptation in a CSCL Environment

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Abstract

In this paper, we present the basic features guiding the development of a web-based CSCL environment, which (i) enables the students to work on collaborative learning activities concerning various subject matters with different orientation, (ii) guides and helps the students at the communication and at the learning level through intelligent agents, (iii) supports alternative models of collaboration between the group members, and (iv) improves/facilitates the collaboration/communication by adapting the provided "communication-scaffolding" tools (i.e. sentence openers - communication acts) according to the learning outcomes addressed by the learning activity and/or the model of collaboration.

SCALE (Supporting Collaboration and Adaptation in a Learning Environment) is a web-based synchronous collaborative learning environment, which adopts features that exist in other CSCL environments and also introduces innovative ones and supports adaptive capabilities.

In SCALE, the design of the collaborative learning activities is based on the learning outcomes that are going to be achieved within the context of the activities (or sub-activities). The learning outcomes are classified to the following four levels of cognitive processes: (i) Comprehension level, (ii) Application level, (iii) Checking-Critiquing level, and (iv) Creation level. The learning activity (or each sub-activity) may include a number of question items, which may imply the use of different support educational tools such as concept mapping tools, simulation programs, etc.

SCALE fosters collaboration and learning through coaching. More specifically, SCALE supports a Collaborative Coach agent, which is responsible for the determination of the appropriate intervention actions at the communication level (e.g. providing motivational prompts in case the students seem to be passive). For the learning process, the Collaborative Coach agent "cooperates" with the Learner Assistant agent in order to guide the students either in an unsolicited form by giving hints/making proposals and/or in a solicited form by serving the students' help requests.

The students may collaborate either in groups up to four members acting equivalently or in pairs acting according to a specific role (e.g. one playing the role of the "driver" doing/proposing things while the second one playing the role of the "observer" asking for clarifications, etc).

Regarding the communication process, SCALE supports adaptivity of the provided "communication-scaffolding" tools (i.e. sentence openers-communication acts) according to the learning outcomes addressed by the learning activity (or sub-activity), and/or the roles assigned by the model of collaboration, providing to the students the most appropriate and complete set of discourse acts, facilitating their interaction, preventing floundering and constraining their thinking to the desired "productive" directions. The semi-structured form of the dialogue is supported in order to (i) guide the students appropriately with respect to the skills that the activities are aiming to cultivate, (ii) facilitate the monitoring of the group dialogue, and (iii) enable the assessment of the students' performance in terms of the learning outcomes addressed. According to the model of collaboration, SCALE supports communication acts when the students collaborate under specific roles. According to the level of the learning outcomes, the use of the sentence openers is considered more appropriate, when the learning outcomes concern the first three levels, since the provided sentence openers can guide the interaction and facilitate the automatic analysis of the group dialogue and subsequently the automatic assessment of the fulfillment of the corresponding learning outcomes. For the Creation level, the communication acts are considered more appropriate, since for higher order cognitive skills, it suffices to guide/assess the students in terms of their intention/action.

The implementation of the environment is in an initial stage. Currently, we are finishing the implementation of the modules/interface for the activity presentation and the group communication. We plan to carry out some additional experimental studies in order to finalize the sets of the communication acts/sentence openers.