Social network analysis support for an IBL wiki-based course

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Abstract

Inquiry-Based Learning can be benefited from computer support enabling more effective and deeper learning processes. Existing approaches to support collaboration, such as interaction analysis based on the idea of social networks, can be applied to this goal. We present in this paper our current work towards the application of two existing tools (SAMSA and Role-AdaptIA) to an IBL-based course for pre-service teachers in our University.

1 Introduction

During the last years we have been involved in the application of active and collaborative learning methods in higher education supported by computers, as part of our research in the area of CSCL (Computer Supported Collaborative Learning) (Koschmann, 1996). More concretely, the experience described in this paper relates to an undergraduate ICT (Information and Communication Technologies applied to Education) course at the Faculty of Education in the University of Valladolid (Spain), which we will call the "NNTT experience"[1].

The course is designed following the principles of Inquiry Based Learning (IBL) (Bruce and Davison, 1996). IBL promotes a global learning process, where we can use the previous experience and interests of the students (Dewey, 1956). It is based on the idea that students are not a “blank slate”. The method works through the inquiry of a series of questions in a “research cycle” where students reconstruct what is already known and what is learnt, working on practical and real problems.

In these processes it is very relevant to give assistance to the teachers and the students, providing methods for reflecting on, monitoring and evaluating the learning processes. This relates to one of our group main research focuses, centred on the area of computer-supported interaction analysis (IA) methods. We have worked on different aspects related to this area, and have produced tools, such as SAMSA (Martínez, Dimitriadis, Rubia, Gómez-Sánchez, 2003), that automates social network analysis processes (Wasserman and Faust, 1994), and Role-AdaptIA (Marcos-García, Martínez-Monés, Dimitriadis, & Anguita-Martínez, 2007), which provides adaptiveness to the IA tools drawing on the concept of role. This paper outlines our current plans to incorporate these tools to the mentioned IBL-based course.

The next section describes how we have applied the IBL approach to our course, and the following one, our current plans to incorporate SAMSA and AdaptIA to these processes.

2 The IBL approach in the NNTT course

The experience to which this paper applies is based on what we have called “Inquiry (cowiki-) based learning”, that enacts the principles of IBL on a wiki space (Jorrín-Abellán, Rubia-Avi, 2007).

The course is divided into four cycles, each one of them spanning between two and four weeks (see Table 1). During these cycles, the students have to collaboratively create products and reflect on major aspects related with the integration of ICT in the curricula of Spanish education centres following the "learning by

[1] The Spanish acronym for this course is NNTT: "Nuevas Tecnologías aplicadas a la Educación"

doing approach" (Dewey, 1956). The students have a real case study as a reference, for which they should generate the required products. This case describes in detail an educative centre, and was designed taking school centres in Valladolid - well known by the teachers - as a reference. The main advantage that features this method is the transfer the students can make of the procedural contents worked out during the course.

Cycle	Duration	Group size	Ask	Investigate	Create	Discuss	Reflect
1	2 weeks / 6 hours	Dyads	Teachers propose a question regarding the influence of ICT in our current society.	Students read articles related to the question.	Students produce a collaborative conceptual map with the main terms used in the ICT field.	Students comment on their partners work.	Students reflect on their work.
2	2 weeks / 6 hours	Dyads	Teachers propose a question about the historic events that helped to promote the present information /knowledge society.	Students read articles related to the question.	Students produce a time-line representing the main aspects in the evolution of ICT.	Students comment on their partners work.	Students reflect on their work.
3	6 weeks / 36 hours	Four members	Teachers propose to develop a technology-based didactic uniy using the WebQuest approach (Dodge, 1995).	Students read about WebQuests.	Students produce a WebQuest.	Students comment on their partners' WebQuests.	Students reflect on their work.
4	4 weeks / 24 hours	Dyads	Teachers propose a few questions regarding the impact of mass media in the education of kids.	Students read articles related to the question.	Students produce a report criticizing an advertisement proposing an educational guide to use it in a class session.	Students comment on their partners work.	Students reflect on their work.

Table 1. Overview of the design of the NNTT experience. The characteristics of each cycle are described, including the concrete activities carried out by the students in each IBL phase.

Each cycle is divided into five phases, according to Bruce's model of IBL: Ask, investigate, create, discuss and reflect. Table 1 outlines the main features of these phases for each cycle. As it can be seen, in the 'ask' phase the teachers pose questions to the students, aimed to trigger the inquiry process; the 'investigate' phase consists of work done by the students to collect data on that question, either in dyads or in four-member groups (depending on the cycle); during the 'create' phase the students are required to create a common product. At the discuss phase, the students are encouraged to read and comment on their partners' products. At the reflect phase, the students should generate a justified answer for the questions posed in the initial phase, as well as the new questions emerged during the process.

During the whole process, the teachers monitor and provide advice to the students. Following our previous experience in CSCL classroom-based practices, we are planning to apply computer-based support to provide teachers and students with information about their collaborative processes. For example, making them aware of the roles they are spontaneously assuming during a phase; identifying which groups add comments to a concrete product; or how many changes a group does after receiving the comments from their classmates. The next section describes the tools we plan to apply to these processes.

3 Adaptive support to the IBL process with SAMSA and Role-AdaptIA

SAMSA (System for Adjacency Matrix and Sociogram-based Analysis) was designed and developed by our group to automate social network analysis (SNA) as part of a more comprehensive approach for the

formative evaluation of participatory aspects of learning in CSCL (Martínez et al, 2003). With the data provided from different sources, including computer logs representing the interactions among participants in a CSCL experience, SAMSA produces several SNA indexes and enables the visualization of the resulting networks as graphs called sociograms. Role-AdaptIA (Role-based Adaptive Tool for Interaction Analysis) is a tool currently built on SAMSA that enables its users (normally teachers) to define the roles relevant in a given learning context, and to specify their characteristics and information needs, in terms of IA indicators. With this information, Role-AdaptIA adapts SAMSA output to the needs of these roles. All these functions have been already applied with success to support regulation and evaluation in previous NNTT courses (see for example, Marcos-García et al., 2007). However, these experiences did not use wikis as the collaboration-support system, and they followed a more general approach to collaborative learning, not explicitly based on IBL principles. Thus, we are currently working on adapting the tools and the methods to the new context.

The adaptation of SAMSA and Role-AdaptIA to the new wiki-based environment should be straightforward, as both tools are based on a generic data format to represent interaction data, compatible with the type of information registered by wiki-based environments to track changes.

Then, the main challenge we face is how the social network and role-based approaches supported by SAMSA and Role-AdaptIA can help to enhance the IBL-based learning process. For example, social networks that display the collaboration structures emerging during the process, including not only the links between the participants, but also between them and their products (concept-maps, WebQuests, comments, etc.), can be of great help to reflect on how the students have worked among them (and with the teachers) as well as with the documents provided to them (in the *investigate* phase) or with the products they have created (in the *create* phase). Social networks can help to gain insight into the *discussion* phases, uncovering who are the most referenced students, who are more active/passive, etc. Role-AdaptIA supports the identification of the roles taken up by the students during the whole process. An important research issue is how to present this information to the participants, and at what phases of the cycles. Role-AdaptIA enables to adapt the output provided by SAMSA to the different roles (in this case, at least, teachers and students), and to specify when this output is going to be provided to them. At this stage, and according to our aforementioned previous experiences (Marcos-García et al., 2007) we plan to provide the teachers with more thorough and frequent information about the cycles of the process, so that they can timely detect special situations that deserve an intervention, and the students with more specific information (about their own roles and participation in the classroom, and their groups' collaboration structures) during the *reflect* phase. This is meant to enrich their reflection on the learning process, including not only aspects related to the task, but also on how they are developing their collaborative abilities.

More details about these research questions and our initial answers to them will be provided at the workshop. All of them will be evaluated in upcoming case studies carried at our classrooms, to assess what is their impact in the IBL processes outlined in this paper.

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