Intelligent evaluation of social knowledge building using conceptual maps with MLN

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Students learning effectively in groups encourage each other to ask questions, explain and justify their opinions, articulate their reasoning, and elaborate and reflect upon their knowledge, and computer tools can help them producing these kind of collaborative learning situations. In this sense, we have developed several tools to support the collaborative learning-process for the Computer Architecture's subject in Computers Science Engineering. This paper present an intelligent tool called SIENA, composed by the open student model, a student conceptual map with multimedia learning nodes (MLN) and Bayesian tests.

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1. INTRODUCTION

In Computer Support Collaborative Learning (CSCL) there are several interaction computer models that give us the functional descriptions and help us in the understanding, explanation and prediction of the behavior group patrons and to support the learning-process in group (Soller2004). These models can help us to structure the environment where the collaboration is carried out, and to regulate the interactions among students during the learning activities. By the other hand, the graphic visualization systems of student's actions and contributions can increase the awareness of their actions (Ogata2000).

Our problem in the area of Educational Data Mining is the definition of a model of collaboration to incorporate in the system SIENA several processes that allows the intelligent evaluation of knowledge building socially using conceptual maps with MLN.
One of the most important aspects in evaluating the process of collaboration is defining the criteria for evaluating such process. An improvement in the collaboration process should bring about the development of end products of higher quality. In order to improve the process of collaboration it is first necessary to evaluate this process with a certain degree of accuracy so that different learning processes taken on by different group of learners can be contrasted. Based on this premise, our proposal includes aspects of the design of the collaborative activities, as well as of the evaluating and monitoring of the collaborative process. In defining the activities, it is necessary to specify the group of people that will make up the group, the required a conditions of collaboration, the nature of the activity, the type, and the mechanisms that provide positive interdependence and coordination. Similarly, through the evaluation of the collaboration process, certain weaknesses of the groups can be determined, and thus, supportive mechanisms and feedback can be provided to them. Through a continuous evaluation and monitoring process, the initial conditions can be re-defined, changing certain activities in order to achieve an environment of greater participation and interaction among the members of the group, which can have a positive effect on the collaboration mechanisms.

2. SIENA: INTELLIGENT EVALUATION TOOL THROUGH AUDIOVISUAL CONCEPTUAL MAPS

Researches on collaboration mode shows new trends in the creation of CSCL tools about the social building of knowledge (Fesakis2004; Martínez-Mones2004), SIENA try to

solve the problem related with the information flow into an collaborative environment of knowledge-build and, through the progressive questioning, allows students more aware of the nature of the process of constructing their own knowledge (Jemann2004). More specifically, it is a web-based application used for two purposes, one is to assess the existing abilities and knowledge of a student and the other is to serve as tool which aids self-study and self-evaluation with its main purpose being to support student focused learning (significant learning). In the process of creation of SIENA, both students in collaboration with teachers, were involved in the creation of content and test questions for each of the themes of the Computer Architecture course, providing content to each node of the concept map. The construction and validation of the volume of questions has been a process carried out during three academic years. In the case of the Computer Architecture conceptual map, it consists of 15 nodes and has about 1500 questions. Moreover, we have integrated into the map MLN using the audiovisual format of ULLMedia (González2010). These nodes are created by the teacher. Each MLN is an audiovisual piece of 5-10 minutes about a concept of the map. Moreover, the MLN has a structure of learning object following the IMS LOM standard, thus, can be reutilized in other contexts.

This web-tool use of adaptive tests based on Bayesian networks is developed in Ruby on Rails and employs concept maps in XML format (Moreno2009).

In the knowledge Bayesian estimation we are going to include several collaboration factors to model the social building knowledge (Avouris, 2004). The estimated social knowledge will be the base to build an adequate automatic feedback.

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