Architecture of a collaborative tutoring system

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Abstract

One of the objectives of online learning systems is to support new learners in order to minimise failure problems and to increase training success. The availability of assistance and guidance can improve cognitive and behavioural levels of learners. This task is dedicated to a human actor, who is “the tutor”. In existing tutoring systems, learner is assigned to one and only one human tutor. The latter can find some problems when the type of required assistance of his learner doesn’t belong to his skills. In addition, the absence of the tutor during a long time for technical or professional reasons is another problem. To overcome these limitations, we study the collaboration among tutors to carry out the task of learner’s monitoring that will enable tutors to meet all the needs of learners seeking assistance. In this case, we face a new research field, which is “CSCTT: Computer-Supported Collaborative TuToring”. In CSCTT, tutors are organized into small groups randomly or according to their skills. They work together using communication tools to monitor and guide their learners. In this article, we present basic principles of a new research field (i.e. CSCTT), which supports collaboration among human tutors. We also offer collaboration model among tutors and a general architecture of a CSCTT system.

Keywords: Tutoring, Collaboration, CSCTT, Tutor, Tutor group, Collaborative tutoring.

1. Introduction

Distance learning is considered as an optimal solution to some problems that are encountered by students in teaching in classes (stress, long and difficult program, etc.). But this teaching method puts the learner in a situation of isolation, lack of observation and supervision by the campus, and excessive freedom which reduces his level. To eliminate these problems, several studies have been devoted to the effects of collaboration among the actors of e-Learning environments. In fact, in CSCL (Computer-Supported Collaborative Learning) research field, researchers are mainly interested in collaboration between learners as means for supporting collaborative learning, which allows the learner to work with the group to achieve a common goal. But, collaboration among learners is not enough to solve the above problems.

In addition, other problems occur in e-Learning systems. Indeed, some learners find difficulties to communicate and share experiences within the group. As result, the monitoring functionality is required in these environments. Tutoring is a key element of any distance learning system. But in existing tutoring systems, learner is assigned to one and only one human tutor. The latter replies his learners’ queries and tries to solve their problems. Furthermore, when learners’ needs don’t belong to the tutor’s skills, the learner’s queries will not be satisfied.

To eliminate these limitations, we studied the collaboration among tutors to carry out the task of learner monitoring that will enable tutors to meet all the needs of learners seeking assistance. In the latter case, we face a

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new research field, which is Computer-Supported Collaborative TuToring (CSCTT). In this paper, we present basic principles of this new research field, which supports collaboration among human tutors. We present a definition of CSCTT, its purpose and its advantages over other types of existing tutoring systems. Also, we offer collaboration model and a general architecture of a CSCTT system.

This paper is organized as follows. In the second section, we present a description of CSCTT. Section three is reserved for studying the effects of collaboration among human tutors. The architecture of a CSCTT system is presented in section four. Finally, in the last section, we offer some screenshots of a CSCTT system called COLLTUS (COLLaborative TUtoring System), which is developed at LabSTIC laboratory (Guelma University).

2. CSCTT: Computer-Supported Collaborative Tutoring

The main goal of computer-supported collaborative tutoring is to support and guide learners to improve their learning level and continuous monitoring. In addition, collaboration among tutors helps them through this important training activity. Figure 1 shows the position of this research field among main related research fields.

As shown by this figure, the CSCTT is the intersection of three research fields: computer-supported collaboration, e-tutoring and collaborative tutoring. To better present this new field, we give some explanations on tutoring and collaboration.

In traditional education, ‘teacher’ often is as a ‘transmitter’ of knowledge, while in distance learning pedagogical mediation is provided by people who are often called tutors. In most cases, these tutors are teachers, and sometimes they ensure tutoring functions in addition to their main activities: teaching in classes. Often, these reconverted teachers receive only a general training in their new function. Under these conditions, they are not able to fulfil their mission to learners (Pamphile, 2005).

Despite this, Glikman argues that “in adults’ training, the tutor is responsible by his intervention to facilitate the learning process and monitoring teaching. His role is as an accompanying person, coach or resource-person. He should facilitate knowledge transfer and assist the student in his learning personal process and assimilation of knowledge” (Glikman, 2002). The four features which appear are: facilitator, coach, guide, and resource-person. On the other hand, “the primary role of the tutor is to discuss with the learners so that the knowledge they build is used in diverse and varied situations” (Salmon, 2003).

In most distance courses, the tutor has mainly a psychological and methodological role to support learners. For George et al. (2004) and Denis et al. (2004), tutor is seen like a pedagogue who has the possibility to build and to adapt activities to learners’ needs, as long as the instructional designer envisaged a variety of activities and possible situations of learning. In this case, tutor’s role is not limited to monitor and support learners: it also consists in preparing specific learning situations from existing generic situations (Garrot et al., 2006).

Many theories about collaboration were developed mainly in two domains: CSCL (Computer-Supported Collaborative Learning) and CSCW (Computer-Supported Cooperative Work). We present here the basic principles of one domain among them, which is CSCL. The latter is a teaching/learning strategy in which two or more subjects interact together to build learning through discussion, reflection and decision making. In this process, computer tools act as mediators (Baeza et al., 99). According to (Lipponen, 03), CSCL is focused on the analysis of how
collaborative learning can raise the interaction between pairs and work groups, and how technology and collaboration facilitate the distribution of knowledge. In this sense, collaboration can be seen as a special form of interaction (Lipponen, 03).

Collaborative tutoring tries to provide its users with a set of tutoring strategies and features. In this case, the intervention or the assistance of tutors will have a collective form. Since this term is new, we offer some definitions that are all important.

**Definition 1:** CSCTT is a learner’s mentoring strategy, which is performed by a group of tutors. It is a collaboration form among tutors to monitor learners. In other words, the aim is to study the way in which technology-supported collaborative mentoring can facilitate and develop distance mentoring.

**Definition 2:** CSCTT is a process that takes into account collaboration among tutors using computer tools. Tutors get together in small groups in order to provide better tracking of learners and to help novice tutors in their mission.

**Definition 3:** CSCTT is a tutoring strategy where the tutors form tutoring groups (also called communities of practice) whose goal is to support learners in their educational activities (learning, assessment ...) using collaboration tools and techniques.

### 3. General architecture of a CSCTT system

A computer supported collaborative tutoring system is a collaborative platform that brings together all tools of distance tutoring in order to provide a space for tutors for working together to assist learners. Figure 2 presents a general architecture of a CSCTT system.

This figure shows the various components of a CSCTT system, which are:

1. **Administrator System (AS):** It manages all the actors of the system (tutors, learners and teachers) and the learning paths.

2. **Learning Management System (LMS):** It manages learning activities and materials. Several means can be used to facilitate the learning process of learners (Lafifi et al., 2010).

3. **Collaborative Tutoring Management System (CTMS):** It consists of two subsystems:
   - A Tracking System of Tutors (TST) that provides the tutor with a set of information to track students (tutoring journal, traces, etc.) and allows responding to learner’s assistance requests.
   - A Tracking System of Collaboration among the Tutors (TSCT), which provides the tutors with a collaboration space presented as a set of collaboration and communication tools (chat, forum, mail, etc.), and mechanisms to monitor the collaboration.

![Figure 2. General architecture of a CSCTT system.](image-url)
In the following paragraph, we present a prototype of CSCTT system. This prototype was implemented at Guelma University. Now, we are working to develop all its components. In this paper, we present only the main developed component. The presentation of the whole system will be the aim of another publication paper.

4. Presentation of COLLTUS:

As mentioned previously, we present in this section a prototype of a collaborative tutoring system, called COLLTUS (COLLaborative TUtoring System). COLLTUS is a platform for learning and mentoring that takes into account the collaboration among tutors. We present in the following paragraph its main component, which is the tracking system of collaboration among the tutors (TSCT).

This system manages traces of tutors during collaboration activity. In addition, it takes into account the management of the collaboration among tutors themselves. This system consists of a manager of collaboration requests that manages the requests issued by the tutor. In the case when the tutor receives an assistance request from a learner (Figure 3), this tutor has the opportunity to work in group and collaborate with another member of his group who has the specified role (according to the type of assistance request). Furthermore, he can collaborate with the whole group. After collaboration process, the tutor must send the response to his learner.

The tutors can collaborate without learners’ assistance request. The objective of this collaboration is to solve problems of novice tutors. So, the subject of collaboration can be related to techniques and strategies of tutoring (learning of tutoring principles).

In COLLTUS, we have two types for collaboration: explicit collaboration and implicit collaboration. The first one is initiated by the tutor asking the collaboration, while the second is initiated by the system when the assistance request type of the learner doesn’t belong to his tutor’s roles.

In addition, this system has a collaboration journal manager that deals with collaborative activities to monitor the collaboration among tutors. Finally, this system possesses a visualization module, which displays the interventions (or traces) on various collaboration activities. This visualization can be done in several ways and formats (see (Lafifi et al., 2009) for some techniques and types of traces visualization).

Figure 3: Collaboration requests in COLLTUS.
5. Conclusion and future work

In this paper, we proposed a new research field (i.e. CSCTT) and an architecture of a collaborative tutoring system (i.e. COLLTUS). CSCTT tries to take advantage from two existing research fields namely computer-supported collaboration and tutoring. It helps solving problems and difficulties encountered by the tutor during the process of learners monitoring in e-Learning environments.

The principle aim of CSCTT is to support collaboration among tutors. For doing this, some collaboration tools such as email, chat and forums are dedicated to tutors. Furthermore, all traces of collaboration activities are saved and presented in a collaboration journal. The latter contains information that can be used to know the isolated tutors or the too solicited ones. In addition, all interactions done among tutors are represented by a social graph.

The main goal of COLLTUS is to support collaboration among tutors by providing them with tools and collaboration space. This space provides the tutors with all collaboration tools to solve problems and satisfy all learners’ assistance requests. Another objective of this system is to create a community of practice containing tutors who can develop and exchange experiences on their job.

In future work, we plan to conduct an experiment of COLLTUS at Guelma University (of course, after its achievement). Furthermore, we propose to develop an algorithm to form groups of tutors and test COLLTUS in domains other than higher education, such as vocational training.

References


