Multi agent-based system for the design of collaborative scripts

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Abstract— **Collaborative learning is not always effective; its effects depend on the richness and intensity of interaction between students during the collaboration [1]. This collaboration is structured using collaborative scripts. Hence, the design of these Scripts is not trivial; it requires information on learners and on their interaction. We believe that when learners are the target of any design, this one needs to be evaluated on the basis of the learners themselves. However, most of the design approaches do not use experimental feedback on the learners' collaboration to improve the initial design. We propose in this article a method for the design of scripts basing on the experimental feedback. We suggest the use of multi-agent systems to provide help and information to the scripts designers.**

Collaboration Scripts, Design Method, Tracking Learners, Traces, Multi-agent system.

I. INTRODUCTION

These recent years, researchers stress more the importance of learning design. Among these researchers, Robe Koper and Tattersall [6] who state that "the key principle in learning design is that it represents the learning activities and the support activities that are performed by different persons (learners, teachers) in the context of a unit of learning".

Koper thinks that the key of the success of the learning environments is the activities and not the pedagogical objects. Consequently, he proposes, to specify the learning situations, the Educational Modelling Language (EML) which focuses on the pedagogical activities. This language was adopted by the IMS Global Learning Consortium to propose the standard IMS Learning Design (IMS LD).

The result of the design of the learning situation is called a script which is considered as a sequence of phases.

In our work, we affirm that this concept (script) is linked to the concept of trace. This later can contribute to the changing of the script, either in a dynamic way in order to regulate the learning, or at the end in order to evaluate and reuse this script.

In this paper, we propose an approach for the construction of scripts taking into account the experimental feedback on the learners' collaboration. The idea is to track the learners when performing the different activities prescribed by a script which is designed at first (preliminary design) and provide feedback on the execution of this script in order to review the preliminary design.

II. OBJECTIVE AND MOTIVATION

A collaborative script (or scenario) is a set of instructions prescribing how students should form groups, how they should interact and collaborate and how they should solve a problem [1]. It structures the collaborative process in order to promote specific types of interactions [2]. A script includes multiple activities, occurring at different various social levels [3]: individual activities (e.g. reading, writing…), group activities (e.g. solving a problem with a peer…), and class wide activities (lecturing, discussion…).

A variety of design methods of scripts have been proposed but none of them take into account the experimental feedback and use it in the process of scripts design. In fact, these methods rarely use the script's evaluation to improve the initial design and most of them focus more on the results of collaboration rather than the process of design itself.

III. AGENT FOR PROBLEM AREA

Learners are different and it is difficult to have an adequate script for the entire group from the beginning. In order to help the designer to modify his script on the basis of learners, we suggest the use of a set of agents having the following roles: decision, interpretation, execution, observation and tracking learners.

The work of the agents starts when the different learners interact with the system.
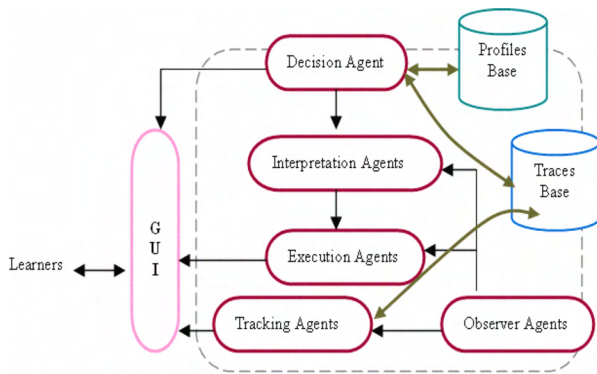
Figure. The conceptual model of Multi-Agent System

A Graphical User Interface (GUI) is used to facilitate the learners' interactions with the system. Each learner has to introduce his profile using this interface. These profiles are stocked in the 'Profiles Base' by 'The Decision Agent'. This agent has a direct relation with 'The Interpretation Agent' which has to specify the script in a comprehensible format for the other agents. This script is executed by 'The Execution Agents'.

'The Tracking Agents' keep track of the learners and stock the different traces in 'the Traces Base'. 'The Observer Agent' monitors the works of the other agents

IV.   THE AGENTS IMPLEMENTATION

To allow learners to access the learning system, a distributed learning environment is proposed for learners located anywhere and connected to learn at any times. It's a multi-agent based distributed learning environment which provides a multitude of learning object for learners of the group which are referenced by the script author.
The learning system consists of the client side and the server side. On the client side it has a JSP (Java Server Page) user interface. On the server side, the servlets and a multi-agent platform implemented using JADE [5].

JADE (Java Agent Development Framework) is a software framework for the development of multi-agent systems and conforms to the FIPA specifications [4]

When learners log on the system through Web based applications, a learner agent upload the profile and requirements and the learner is affected to the assigned group. The script is uploaded and the execution of the script will be performed.

V.   CONCLUSION

Collaboration has certain advantages for learning. To profit from these advantages, the learners' collaboration should be structured and organized. Hence, scripts are used to structure the desired interactions among learners.
The design of these scripts is not easy, for this reason we suggest to help the designer to take into account the behaviours of learners and their interactions.

In this paper we presented a multi-agent based system for the incremental design of collaborative scripts. The main agents of this system are, namely, 'The Decision Agent', 'The Interpreter Agents', 'The Execution Agents', 'The Tracking Agents', 'The Observer Agents. These agents have the following roles: decision, interpretation, execution, observation and tracking learners.

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