Mining the collaborative process at the tabletop

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1. AIMS
The goal of this research is to provide an approach to study the co-located collaborative process mediated by tabletop computers and explore the potential of these in educational contexts. In order to scrutinise this we are building the framework to enable students to externalise their individual knowledge and build an artefact collaboratively. Therefore, this project focuses in two main aims:

• To propose methodologies to study collaboration around the tabletop
• To gain understanding about the collaborative cognitive process.

2. INTRODUCTION
The affordances that computers offer can empower the collaborative relationships between people. Both software and hardware can offer new ways of interactions with computers to support communication between peers and organization of their knowledge. Interactive tabletops provide a novel intuitive interface that is natural for collaborative tasks. However, as attractive as the introduction of new technologies affords new ways of interaction and communication they also introduce new challenges by changing the social and physical context conditions. Our research explores these affordances and challenges perceived when small groups interact to externalise their knowledge of a domain through the mediation of tabletop interface.

3. SYSTEM OVERVIEW
We are developing a learning environment for tabletops that supports small group of learners to externalise their knowledge through the construction of a group concept map. The purpose of this is to help learners and their teachers to gain a clearer understanding of each learner’s knowledge and misconceptions as well as to collect the footprints of participants’ collaborative activities. Features of this system should be:

• The students must be able to use the different concepts that they already know.
• They should link their concepts with others’ participants pieces of map.
• They should be encouraged to combine their ideas.

We aim to support this by providing a user interface which maintains the collaboratively created group map as well as one layer per user showing their individual contributions to the map. We are also exploring mechanisms for supporting negotiation between users by highlighting disagreement.

4. FUTURE WORK
Drawing on the considerable work on collaborative learning, one important indicator of collaboration is the notion of symmetry. Group members have to articulate their thoughts to convince others or to explain their point of view. They externalise their thoughts to other participants and, potentially, leave digital traces of this process.

We plan to analyse these traces to better understand, model and visualise this process. The image at the left shows one way to visualise symmetry of participation in which each triangle represents one dimension of the logging (e.g. verbal participation, touches on the tabletop, real contributions) and the vertices are closer to the participant who did the most of the actions.

Radar of symmetry of action

How to apply data mining techniques to logs of collaboration?

5. RESEARCH ISSUES
• How to track who is doing what at the tabletop?
• How to model collaboration taking into account multiple participants
• How to apply pattern mining algorithms to logs of collaborative interactions?
• Which visualisations can best give hits about what is going on in a collaborative tabletop?
• How to relate quantitative results and qualitative heuristics derived from experts in pedagogy (the professors)?