Idea Map Editor: a tool for promoting reflection in the act of learning

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Abstract
Along this paper Idea Map Editor is presented, a brainstorming tool based on Concept Maps valid for promoting reflection. Applied to the act of learning, reflection is a mental process that allows participants to use critical thinking to examine presented information, question its validity, and draw conclusions based on the resulting ideas.

1. Introduction
Brainstorming is a technique for divergent thinking [1]. It can be individual, although the term more often refers to a group process for generating as many ideas as possible in response to an open question. Thus, it is frequently used for collaborative creative problem solving [2]. Idea Map Editor is a collaborative brainstorming software based on concept maps that provides learners with a tool to afford a situation where it is necessary to reflect on some particular circumstance addressing a problem, sharing ideas or gaining understanding.

The paper is structured as follow. First previously developed brainstorming tools are analysed in order to identify desirable characteristic for such systems. Next the basis and main design issues of Idea Map Editor are described. Finally some conclusions are remarked.

2. Related work: brainstorming software
In order to develop a brainstorming session the next steps must be carried out: set the problem, create a background memo describing the session, select participants, create a list of lead questions, conduct the session and evaluate the ideas and select one as the solution to the problem proposed to the group.

Next, eight widely used brainstorming tools are analysed identifying their main characteristics: SMART IdeasTM Concept-Software (www2.smarttech.com), Concept Draw MINDMAP 5 Professional (www.conceptdraw.com/), XMIND 2008 (www.xmind.org), MindManager (www.mindjet.com), Inspiration (www.inspiration.com), CmapTools (cmap.ihmc.us/), FreeMind (freemind.sourceforge.net), and Bubbl.us (www.bubbl.us). Their key features are the following ones: commercial or free software, local or web application, originally designed for brainstorming or not, the support for working collaboratively, communication mechanisms, way of introducing new ideas, use of different structures for organizing ideas, possibility to specify the idea priority, whether a schema view corresponding to the graphical idea organization exits or not, tool with a multilingual user interface, and provision of a clock to control the session duration. Table 1 describes each brainstorming tool based on these features. Cells in grey mean that feature is not fulfilled.

It is remarkable that the majority of the analysed software is commercial. Most of the tools are based on concept maps or mind maps. In addition, the tools were not originally developed for conducting brainstorming sessions; they have been developed using including a brainstorming module to existing drawing software. Most systems work as local applications and provide both a mechanism for fast edition of new ideas and a multilingual user interface. Only half of the analysed tools include automatic idea organization using different structures, and the same proportion includes special mechanisms for idea priority representation. Most of the tools provide a schema view mechanism meanwhile only two systems provide a clock to control the session duration. Three of the analysed systems allow working collaboratively and only two provide some communication mechanisms between users.

3. Idea Map Editor
Idea Map Editor is Java software based on Concept Maps [3] that allows users to develop brainstorming sessions creating an Idea Map and reflecting on it. As most of the analysed brainstorming software Idea Map Editor has been developed as an extension of two Concept Maps editors. Idea Map Editor uses a combination and specialization of CM-ED and ElkarCM (http://galan.ehu.es/Galan).

Concept Map EDitor (CM-ED) is a multilingual software for Concept Maps edition [4]. Elkar-CM is the collaborative version of CM-ED [5] that allows synchronous collaboration based on token-passing. It is able to work with different views of the same CM.
Idea Map Editor follows a client-server architecture and allows users to develop a brainstorming session both locally or remotely. Three main software components are necessary: IM (Idea Map) server, IM client and IM manager.

**IM-Server** is an extension of CM-ED responsible for knowledge sharing in the community of users. It also supports and controls the collaboration between users. The functionality of the server includes the communication with the clients, the managing of the Idea Maps and supplementary resources, i.e. multimedia files, the support of the communication between the users.

**IM Client** is also a variation of CM-ED. Using this client the users can participate on the brainstorming session adding and modifying ideas and relations between them as well as resources in the Idea Map. The client allows the users to attach priorities, notes, flags and multimedia files to the ideas and the relationships. This module adds to CM-ED the functionality for managing Idea Maps and resources shared in the server and also the possibility to communicate with other users using a chat. The user can select the structure of the Idea Map, use the clock facility and supervise the Idea Map in a schema view.

The **IM Manager** remotely controls the server. Using this program the administrator of Idea Map Editor can manage the users of the system, manage the group of users working in a brainstorming session, configure the server, for example limit the time for the turns, and, finally, stop the server.

When working locally with Idea Map Editor, it is supposed that all participants in the reflecting session are in the same room and the session supervisor is the responsible for using the computer software. So s/he creates and manages the session collecting the participants’ ideas.

Developing a session collaboratively implies to work with more than one computer connected through the net and, probably, separated geographically. When working collaboratively with Idea Map Editor two user roles co-exits: supervisor and normal user. The former is responsible for creating a new collaborative brainstorming session, inviting other users to participate in the session (normal users) and even s/he can appoint other supervisor. Only map supervisors

<table>
<thead>
<tr>
<th>Creator</th>
<th>SMART tech. ULC</th>
<th>Odessa Computer Systems</th>
<th>Mango Sw</th>
<th>Mindjet</th>
<th>Inspiration software</th>
<th>IHMC</th>
<th>Mueller, Polansky, Foltin et al.</th>
<th>Edelman &amp; Amelyan</th>
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</thead>
<tbody>
<tr>
<td>Free software</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local / remote</td>
<td>Local</td>
<td>Local</td>
<td>Local</td>
<td>Local</td>
<td>Local</td>
<td>Local</td>
<td>Local</td>
<td>Web</td>
</tr>
<tr>
<td>Kind of tool</td>
<td>Concept map ed.</td>
<td>Mind map editor</td>
<td>Mind map ed.</td>
<td>Mind map editor</td>
<td>Concept map editor</td>
<td>Concept map editor</td>
<td>Mind map editor</td>
<td>Brainstorm. tool</td>
</tr>
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<td>Collaborative work</td>
<td>Synchronous</td>
<td>Non-synchronous</td>
<td>Non-synchronous</td>
<td>Non-synchronous</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication mechanisms</td>
<td></td>
<td>Chat Annotation Multimedia files</td>
<td></td>
<td>Annotation Multimedia files</td>
<td></td>
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<td></td>
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<tr>
<td>Automatic idea organization</td>
<td>10 different structures</td>
<td>Some different structures</td>
<td>4 different structures</td>
<td>Some different structures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How to represent idea priority</td>
<td>Nothing specific</td>
<td>Icons</td>
<td>Icons</td>
<td>Icons</td>
<td>Nothing specific</td>
<td>Nothing specific</td>
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<tr>
<td>Schema view</td>
<td>Editable (create, delete, modify)</td>
<td>Editable (create, delete, modify)</td>
<td>Editable (create, delete, modify)</td>
<td>Editable (create, delete, modify)</td>
<td>Non-editable</td>
<td></td>
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<tr>
<td>Multilingual interface</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Clock | Yes | Yes | Yes | Yes |}

Table 1. Brainstorming software: a comparative
can modify the main reflecting idea and control the time for the session.

Figure 1 shows a snapshot of a reflecting session on Global Warming using Idea Map Editor. On the right side the figure shows the area for drawing the Idea Map. The window on the left bottom includes the basic functions for managing the brainstorming session. On the left upper window the system provides users with mechanisms to collaboratively work: token control functions and the chat area.

6. Conclusions
Combining techniques of concept mapping and collaborative learning makes possible to develop tools for promoting reflection in the act of learning. A brainstorming tool like Idea Map Editor can help people in many learning scenarios where a reflection process is necessary in order to narrow possible solutions to a problem and eventually form a conclusion.

Idea Map Editor is a concept map based brainstorming tool that fulfils the following features: (1) local and remote collaborative brainstorming sessions, (2) fast edition of new ideas, (3) different structures for automatic organizing ideas, (4) mechanism for prioritizing ideas, (5) schema view of the graphical idea organization, (6) interface localization to different languages, and (7) clock allows supervisors to control the session duration. Even more, when working collaboratively Idea Map Editor provides different ways of communication between users: chat, annotation of ideas and relationships, and multimedia files.

References

Acknowledgements. Work supported by MEC (TIN2006-14968-C02-01) and Univ. of the Basque Country (UE06/19).