A COMPARATIVE SURVEY ON MIND MAPPING TOOLS

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ABSTRACT

Mind Mapping is an important technique that improves the way you takes notes, and enhances your creative problem solving. By using Mind Maps, you can quickly identify and understand the structure of a subject and the way that pieces of information fit together, as well as recording the raw facts contained in normal notes. It can also be used as complementary tools for knowledge construction and sharing. Their suitability as a pedagogical tool for education, e-learning and training, increases their importance. Also, in a world of information overload and businesses struggling to keep up with the place of change, knowledge workers need effective tools to organize, analyze, brainstorm and collaborate on ideas.

In resent years, a wide variety of mind mapping software tools have been developed. An often question that comes up, due to this plethora of software tools, is "which is the best mind mapping software?" Anyone who gives you an immediate answer either knows you and your mind mapping activities very well or their answer in not worth a lot. The "best" depends so much on how you use mind maps.

In this paper we are trying to investigate different user profiles and to identify various axes for comparison among mind mapping tools that are suitable for a specific user profile, describe each axis and then analyze each tool.

Keywords: mind mapping tools, brainstorming, e-learning, survey.

INTRODUCTION

Mind mapping was firstly developed by Tony Buzan, a mathematician, psychologist and brain researcher, as a special technique for taking notes as briefly as possible whilst being interesting to the eye as possible. Since then, mind mapping turned out to be usable in many different ways other than just simple note taking. Some people use them for study, some for planning projects, some for organizing information, some for sparking ideas and facilitating brainstorming sessions, some for planning the writing of a report or blog.

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The method of mind mapping takes into account that the two halves of the human brain are performing different tasks.

While the left side is mainly responsible for logic, words, arithmetic, linearity, sequences, analysis, lists, the right side of the brain mainly performs tasks like multidimensionality, imagination, emotion, color, rhythm, shapes, geometry and synthesis.

Mind mapping uses both sides of the brain (Buzan, 1976), letting them work together and thus increases productivity and memory retention. This is accomplished by representing logical structures using an artistic spatial image that the individual creates.

Thus, mind mapping connects imagination with structure and pictures with logic (Svantesson 1992, Marguilies, 1991).

Mind maps are hierarchically structured. They are produced following the rules given below (T. Buzan & B. Buzan 1993, Hemmerich et al. 1994, Hugl 1995, Svantesson 1992):

➢ Use a large sheet of paper without lines in landscape format.
➢ Place the topic of the mind map in the centre of the paper. (The topic of the mind map should be displayed in an eye-catching way, preferably by a colored image. If a picture does not seem appropriate, the topic should be named by a well-chosen keyword. See figure 1)
➢ From the topic draw a main branch for each of the main ideas linked to the topic. Write keywords denoting the main ideas directly on the lines. Use printed letters. (The order of the branches is not important. If a special order is needed for understanding the topics, the branches may be numbered or ordered clockwise. If possible, only one word per line, preferably a noun, should be written down. As 90% of the worlds in texts are unnecessary, using a few meaningful keywords will be sufficient to remember the entire context.)
➢ Starting from the main branches you may draw further lines (sub-branches) for secondary ideas (sub-topics) and so on. The order follows the principle: from the abstract to the concrete, from the general to the special.
➢ Use colors when drawing a mind map.
➢ Add images, sketches, symbols, such as little arrows, geometric figures, exclamation marks or question marks, as well as self-defined symbols to your map.

Mind maps can be used in many different situations. They are extremely useful for a variety of applications. Commonly, the following functions have been described for mind mapping in literature:
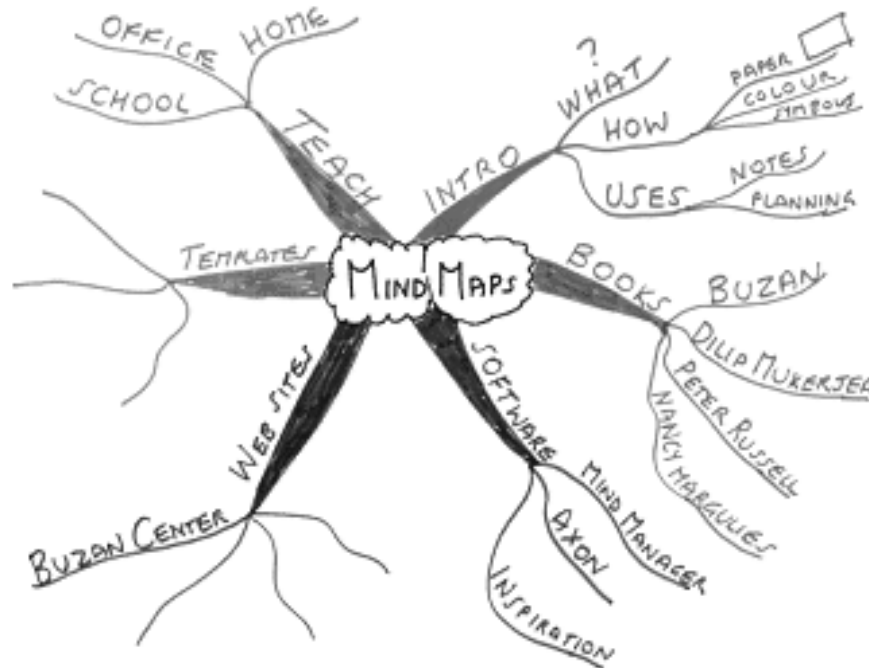
Figure: 1
A mind map example

> ➢ **To visualize human information exchange (e.g. workshops, project of staff meetings, brainstorm sessions and strategy sessions).**
> ➢ **To organize, reorganize and filter the thoughts and ideas that are collected.**
> ➢ **To analyze and structure the information, to identify relationships between key points.**
> ➢ **To improve knowledge management systems. The mind map can be used as a visual interface that contains information or external links. Latest software allows automatic build-up of the mind map by search engines and renewal of the content by refreshing.**
> ➢ **To produce and present information in a better way. Mind map can be automatically converted to other forms of communication, such as: web sites, presentations and email.**
> ➢ **To better manage the information for meetings, presentations, projects, proposals, research and contacts. Both in the preparation phase, the execution phase and the follow-up phase.**

Finally, mind maps can be used for a large range of activities, including note-taking and reporting, brainstorming, clarifying of thoughts, summarizing, presentation, planning team building and group communication etc. In spite of its well-structured and ordered contents a mind map may sometimes, appear confusing. Mind maps are very individual graphic representations. As different people have different associations with the same topic they also draw different mind maps. The correct grasp of the relations represented in a mind map affords the right associations to the used key words.

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Hence, any mind map that someone wants to use should be drawn by that individual or group to which the individual belongs. In a mind map each main branch builds up a complex whole with its sub branches. Connections between the single aspects are not drawn in order to increase the clarity of the map. Thus, the relation in the mind map is probably incomplete.

In this paper we make a detailed comparative survey of the main software tools that have been developed for mind mapping. We consider five mind mapping tools, FreeMind, NovaMind, OpenMind, XMIND and iMindMap. Firstly we describe the key features of the surveyed tools and then we try to compare them. The comparison is not done in a way to reveal the best mind mapping software. We are trying to make clear their similarities and differences, in order to guide users to find which tool fits better their profiles and needs.

MIND MAPPING TOOLS OVERVIEW

The usefulness of mind maps can be proved by the plethora of mind mapping software tools that are available in the market. For example, Aviz Thought Mapper, BrainMine, ConceptDraw MINDMAP4, Eminec MyMap, FreeMind, HeadCase, iMindMap, Inspiration, MapIt, MindCad Pyramin, MindChat, MindGeniuw, MindMappes, MindManager, MindPad, NovaMind, OpenMind SoftNeuron, VisiMap, VisualMind and XMind, are only a part of them.

Due to space limitations, a complete review and comparison of all these tools was not achievable. So we focused on a representative subgroup of the available tools.

In this section we overview five mind mapping tools. These are FreeMind, iMindMap, NovaMind, OpenMind, and XMIND. We briefly describe the main key features of each tool and we indicate the class of users for which each tool fits better.

FreeMind
FreeMind(http://freemind.sourceforge.net) is a premier free mind mapping software, licensed under GPL (GNU General Public License) written in Java. The recent development has hopefully turned it into high productivity tool. The presence of a simple and intuitive interface makes the application easy to use and understand. The entire process of creating, using and sharing mind maps is made in a very user friendly way. From a practical point of vie, it does allow users to try out a different way of structuring and visualizing content. By visualizing content and its various connections in a fluid way, users may be able to gain a better grasp of it all. All these characteristics have helped in increasing the popularity of the application. In the next paragraphs we describe the main features of this software as well as the current users for which this tool is a working solution.

Freemind has an interesting set of useful features and essential properties. By using FreeMind, users can easily create mind maps with nodes. They can edit, format and apply patterns to a node by working with physical styles. They can also highlight nodes, using clouds, adding hyperlinks, icons and graphical links to the nodes. By a simple mouse click, they can create links to the local files in their system or any other web page.

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The software supports the ability of hide or display all the information below a selected node. HTML links can be stored in the nodes, including World Wide Web links and links to local files. It includes the possibility of copying nodes or styles of nodes, dragging and dropping of multiple selected nodes, dropping of texts or list of files from outside. It also supports smart copying and pasting. This feature helps in pasting of links from HTML or structuring the pasted content on the basis of the number of leading spaces in a line; pasting of lists of selected files. You can also export maps in HTML format. With this feature, the mind maps can be converted to a standard, hierarchical text structure. The File mode can be used to browse the files on a computer, seeing the folder structure as mind map.

FreeMind exhibits low cost of risk of switching away to another mind mapping tool because it stores maps in XML format. If a user has a lot of maps created by FreeMind and wants to switch to another program, writing a conversion program should be easy, especially if that program features Visual Basic scripting facility. It also supports some advanced operations, like selecting multiple nodes, folding and navigating. The users can access detains regarding exporting and importing mind maps. They can use web applets; attach rich text and pictures in nodes.

FreeMind is primary a tool for editing mind maps, but it is also designed to be able to view data coming from various data sources. A programmer has to write a mode for every data source, to make that specific data source available for viewing in FreeMind. It allows placing URIs, which get resolved by a WWW browser when activated. This can be seen as navigational link support to some extend. Its HTML export facility is not useful when talking about moving a hierarchy to navigational hypertext, because FreeMind only exports an outline view as a single HTML file. (Atzenbeck et al 2003)

The potential user of this product can use it for a variety of purposes. FreeMind is suitable for keeping track of projects, including subtasks, state of subtasks, and time recording. It helps in managing information, including links to necessary files, executables, and source of information. A user, who wants to keep collections of small or middle sized notes with links on some area, will find it useful. Such a collection of notes is sometimes called a knowledge base. This tool can also guide users in writing essays and brainstorming their ideas, using colors to show which essays are open, completed, not yet started etc, using size of nodes to indicate size of essays. Database users, they will find it helpful because they can keep a small database of something with structure that is either very dynamic or not known in advance. Finally Internet users can be helped by maintaining commented internet favorites or bookmarks, with colors and fonts having the meaning they want (S. Kumar, 2006).

iMindMap

iMindMap (www.imindmap.com) is the first and official T. Buzan mind mapping software. It is the only software product that fully duplicates T. Buzan's renowned mind mapping techniques. In 2006, the Buzan organization decided to lunch its own mind mapping program – iMindMap – with an aim of creating a software environment that would closely mimic the process of creating hand drawn maps. In figure 2, can be seen a mind map created with iMindMap tool. It's easy to see the similarities with a hand written mind map.

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In 2007, iMindMap2 was released, and it shows tremendous promise. It delivers on the promise of creating a more organic interface for creating mind maps, while also offering numerous features that should satisfy all but the most demanding businesspeople.

Figure: 2
Example of mind map created using iMindMap.

iMindMap 2 offers a simple but well designed interface. You can easily place your central idea in the middle of the screen and add topics and subtopics by a simply way. iMindMap creates predefined branch shapes, but you can also switch to a hand-drawn branch mode if you want to get more creative.

It also gives you access to an extensive selection of topic icons, plus an online library of nearly one million images, which you can utilize to enhance your map. Topics may contain nodes, as well as links to web pages and files. It also includes a full featured word processor that lets you create highly formatted text in the notes window.With the so called "SpeedMapping mode", you can enter ideas into your map quickly, using only the keyboards. It also automatically reformats your map as new branches are added, ensuring that your branches stay well organized. It includes a Pen mode, which enables you to utilize the program on a Table PC, with an interactive whiteboard or on a PC with a graphic tablet input device. The program even gives you the option of displaying larger control points, which make it easier to select them when using a Table PC or whiteboard input device. In general Pen mode gets you even closer to the experience of hand writing a mind map.

iMindMap has a powerful keyword search capability. This capability not only enables you to search for a specific word within the current map, but you can also do an expanded search that looks for it in all of the mind maps within a specified directory at your computer.

The developer has wisely included a full complement of export options including the ability to export as image, document, web page, pdf or presentation file. In addition, you can copy your mind map to a clipboard and past it into another application – which represents a quick and easy way to share part or your entire mind map with others.

Finally is supports cross-platform compatibility. Because it is built on Java technology, it can utilize on Windows-based PCs, Apple Macs and certain versions of Linux.

iMindMap is suitable for use in schools and colleges and can be applied to any thinking task, actively engaging students of all ages in creative thinking, organizing and problem solving Its flexibility makes it suitable for any subject or theme and it can be used in whole class, group or individual settings to generate ideas, find inspired solutions, presents concepts and diagrams, analyze findings, summarize information, aid interaction between students in group work and in general improve memory recall of facts, words and images. It can also be used to manage effectively human resource tasks. For example, to facilitate employee appraisal schemes and to outline employee training and development programs. It facilitates communication between individuals, in the boardroom and across companies, by avoiding misunderstandings and settle disputes.

NovaMind

G. King and his team of developers are the creators of NovaMind tool (www.novamind.com). With the recent release, version 3.2, NovaMind incorporates dozens of productivity enhancing features. In the next paragraphs we will take a closer look at the most significant new and improved features of this promising mind mapping software application. The "ribbon" toolbar is by far the most significant upgrade to this mind mapping program. It resembles the "ribbon" toolbar that Microsoft recently introduced on its new Office 2007 suite of productivity applications. NovaMind is the first mind mapping software to offer this enhancement. It also supports the capability of the brainstorming mode, with which you can quickly enter a large number of ideas into your map, without the program getting away.A unique "snap lines" feature helps you to vertically align branches to each other, and it helps you to create neatly arranged maps. You can also move and reshape your map branches with great deal of creative freedom. It supports enhanced right click functionality. When most programs display a text-based drop-down list when you right click on a map element, NovaMind's implementation is clearly much more visually oriented – perfectly appropriate for a mind mapping program.

Concerning hyperlinks, NovaMind is enriched with the ability to attach multiple hyperlinks to a single branch. This feature makes it quite advantageous to business persons. Many mind mapping programs offer a full screen mode, which enables you to view your mind map with toolbars and other interface elements removed from the workspace. But the developers of NovaMind took this capability one step further. You can actually edit your map in full screen mode. This could be especially useful when you're working with a large or complex map. You can also create one parent map and multiple sub-maps, and maintain all of them in a single file.

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Another way that this software is interesting is the extensive set of options it offers for printing your mind maps. You can scale your printed map by percentage, make it to fit on one page or specify the number of pages high and wide you want it to print out.

NovaMind is a generic mind mapping tools and can be user efficiently by students, teachers, it helps you organize topics for an agenda, to make fast and effective project planning and in general can be applied to any thinking task (King G. 2007).

OpenMind

MatchWare OpenMind (www.matchware.com), is a professional mind mapping software application that allows users to brainstorm and visualize ideas. It captures the full potential of mind map. Especially business edition provide users with a solid set of visual mapping tools that are very well suited to managing projects, plus numerous well designed features that make it a pleasure to use.

In general, OpenMind has a simple and unique way to add branches sequentially at the current level of a map. Moreover, it enables users to insert a topic one level above the currently selected topic. It is also fast and easy to incorporate a picture into a central topic or add icons to any branch. It centralizes all of the icons for adding objects, such as hypertext links, file links and multimedia objects. Users can attach multiple objects per branch.

Another valuable feature of OpenMind is the comments handling. Whenever a user adds a pop-up comment to a topic, it remains hidden from view, except for a small icon next to the topic. When mouse over this type of comment, a window pops up, displaying the text contained within your comment.

The advanced functionality offered by Business Edition enables users to use it as a capable project management tool.

They can attach detailed task information to individual map topics, including dates, priority levels and resources. If someone adds tasks and timeline information to a map topic, he can take advantage of the program's timeline view, which automatically displays a horizontal line with callouts for each task-related topic. This feature will probably be of interest to project managers.

OpenMind has an effective way to develop business plans. Whenever a user develops a business plan alone or as a team, OpenMind has an effective way to outline and present an overview of the business strategy, marketing plans and brainstorming ideas. It has a big collection of templates that helps user to create easily new business plans. It lets you also to develop your mind map in 6 different views depending on the nature of data. The user can easily switch back and forth between views at any time while creating maps. With one-click export to Word and PowerPoint, OpenMind instantly converts business plans to a report or presentation. It even let you schedule the implementation of business plans using the built-in Gantt chart or timeline (a Gantt chart is a horizontal bar chart used to illustrate a project plan and to coordinate and track the progress of the individual tasks required to bring the project to completion).

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OpenMind is especially effective for performing SWOT analyses (Strengths, Weaknesses, Opportunities and Threats), by simply creating a web of ideas on a mind map. It can also be used as a choice of federal, state and local law enforcement for gathering information and creating professional tilelines of accident and crime scene data.

For educational purposes it can be used to create an outline for written documents such as essays or research papers. It supports detailed curriculum-aligned templates for Language Arts, the Sciences and Social studies.

XMind

XMind, (www.xmind.org) developed by Mongo Software of Beijing, China, is one of the newest entrants in the filed of mind mapping software, available for Mac, Windows and Linux. The latest iteration of XMind 2008, offers an impressive collection of well thought-out, easy to use features in a polished, professional user interface.

The user interface consists of a large workspace, with toolbars and tabbed dialog boxes running down the right side of the screen. It supports an amazing variety of visual map types – everything from a traditional mind map and organization chart to a fishbone diagram (used to show cause and effect) and logic diagrams.

XMind treats the attachments as topics, which means that any number of different properties can be assigned to them. Users can drag and drop files into the XMind workspace, attaching them to a topic or making them free floating. Attachments automatically travel with XMind files, making it easier to share maps with others.

Audio notes can also be added quickly to a topic. They're saved in MP3 format, although currently there doesn't seem to be a way to extract audio notes. Another key feature of Xmind is the ability to utilize multiple layouts structures within the same map. Options include traditional mind mapping structures (map, left tree, logic charts, org charts) as well as 2D chart (analogous to a spreadsheet clipping).

There are also features that enable users to take a "snapshot" of part or all of the maps – an image that can then be loaded into another program. It is a fast way to pull map's content into another program, without having to export it. Concerning map connections, the users can create a set of free floating topics, and then make whatever connections between them that they desire. They are not constrained to having one central topic.

Different from the traditional linear slide-shows which limits the imagination and creativity and makes meetings less participatory, Xmind introduces users to a brand new presentation style, perfectly combining point focus and holistic concept grasp, with fully customizability and interactivity.

Xmind can be used for meeting, project, information and time management, in education and academy, for brainstorming, for note taking and collaboration. (Mango Du, 2007)

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COMPARISONS

In this section, we identify various axes for comparison among the surveyed mind mapping tools, describe each axis and then analyze each tool. We didn't measure the quality of the described software application. However we categorized the representative key features in a systematic way. Our goal was to aid the future users to select the mind mapping tool that fits better to their needs.

The selected axes for comparison was the supported operating system, the supported map formats, the topic, map and advanced features, the supported modes, the interface features, the integration with other applications and finally the supported export formats. In the previous section we described with details, for each software application, the supported key feature, but here we summarize the obtained results.

Concerning operating system all the surveyed tools can be installed on Windows. OpenMind is not suitable for Mac and Linux users, and NovaMind is not supported only by Linux.

Xmind has the richest capabilities on formatting maps, while Freemind supports only traditional maps. iMindMap and NovaMind does not support organizational and fishbone charts. OpenMind does not support fishbone maps.

Regarding features, all the surveyed tools use markers, notes and hyperlinks. NovaMind and Xmind have the extra functionality of multiple links per branch. All of them support images as background or as objects on the maps.

They also have wizards that guide users on map creation, and customizable branch shapes. iMindMap and NovaMind are more directed to freehand style. So they maintain freehand drawing tools. FreeMind is the only tool that is not embedded with the functionality to attach files on map. In general we could say that NovaMind is the tool with a real wide spread of attached features.

OpenMind is a tool specialized on Windows operating system, so is the only one with full Microsoft Office Integration. XMind supports partially MS Office (Word and PowerPoint only).

Map can be exported by all surveyed software tools as html web pages, as images and as XML files. FreeMind is the only tool that is not support PDF extraction. As expected, OpenMind is powered with MS office extraction capabilities.

In the next table (Table: 1) we give detailed a mind mapping software comparison chart.

Following the results, summarized on the above table, it is clear that none of the surveyed software tools outperforms others. We can say that each tool has useful and unique features and refers to a different class of potential users.

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Table: 1
Mind mapping software comparison chart

	Freemind	iMindMap	NovaMind	OpenMind	XMind
OPERATING SYSTEM					
Windows	●	●	●	●	●
Mac OS X	●	●	●		●
Linux	●	●			●
MAP FORMAT SUPPORTED					
Traditional	●	●	●	●	●
Directional		●	●	●	●
Organizational charts				●	●
Fishbone					●
TOPIC FEATURES					
Map markers	●	●	●	●	●
Customizable symbols		●	●	●	●
Task related info		●	●	●	●
Priority related info		●	●	●	●
Call out topics		●		●	
Notes	●	●	●	●	●
Hyperlinks	●	●	●	●	●
Multiple links per branch			●		●
Embedded attachments		●	●	●	●
Topic numbering	●	●	●	●	●
Topic boundaries	●	●	●	●	●
MAP FEATURES					
Floating topics	●	●	●	●	●
Background image	●	●	●	●	●
Multi-page document			●		●
Customizable branch shape	●	●	●	●	●
Freehand drawing tools		●	●		
Spell check		●	●	●	
Wizards	●	●	●	●	●
Relationship lines		●	●	●	●
Import images to maps	●	●	●	●	●
ADVANCED FEATURES					
Review map with others				●	
Search topics		●	●	●	●
INTEGRATION WITH MS OFFICE					
Word				●	●
Excel				●	
PowerPoint				●	●
Outlook				●	
MS Project				●	
Internet Explorer				●	
EXPORT FORMATS					
PDF		●	●	●	●
Word				●	●
PowerPoint				●	●
Outlook				●	
MS Project				●	
HTML web page	●	●	●	●	●
Image formats	●	●	●	●	●
XML	●	●	●	●	●

CONCLUSION

In this paper we briefly surveyed five mind mapping tools (FreeMind, iMindMap, NovaMind, OpenMind, XMind), and compared their features. Initially we made an introduction to mind maps, explaining their characteristics and their usefulness in human information exchange. Next we made an overview, describing the key features of each surveyed software tool. We also described the class of users and the possible applications that fits better to each tool. Finally we summarized the key feature of each software application by comparing them on a set of various axes and we collected our results on a comparison chart (Table 1).

Our objective was not to make a quality order or to reveal the "best" software tool. Our goal was to notice the most representative key features of each tool, and to aid the future users to select the mind mapping tool that fits better to their needs.

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