

Mind Mapping: Scientific Research and Studies

ThinkBuzan Ltd

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Inventors of Mind Mapping .com

Mind Mapping: Scientific Research and Studies

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PART 1

RESEARCH STUDIES ON MIND MAPPING

Summary Report

Summary Report - Research Studies on Mind Mapping

The phenomena of Mind Mapping is now world-renowned, so why is it that millions of people around the globe find it such a useful tool for creative thinking, planning and collaborating with others?

There are numerous studies providing overwhelming evidence verifying the science behind Mind Mapping, so here are some of the exciting results that are confirmation as to exactly why Mind Mapping can help you.

Boost your memory

At the heart of Mind Mapping is the striking combination of imagery, colour and visual-spatial arrangement, which is proven to significantly improve information recall, compared to conventional methods of note taking and learning.

A study by Toi (2009)¹ shows that Mind Mapping can help children recall words more effectively than using lists, with improvements in memory of up to 32%.

And according to a study conducted by Farrand, Hussain and Hennessey (2002)², Mind Mapping improved the long-term memory of factual information in their participants by 10%.

Foster your creativity with Mind Maps

Ever suffer from writer's block? Do you experience brain freeze rather than brainstorm? This is where Mind Maps can help you. Their spatial layout helps you gain a better overview and makes new connections more visible so you can create an infinite number of thoughts, ideas and associations on any topic – perfect for fostering creativity and generating new ideas whenever the mood takes you.

A study by Al-Jarf (2009)³ confirms that Mind Mapping software offers a powerful approach for improving the ability of anyone to generate, visualise and organise ideas. The subjects taking part in the

¹ Toi, H (2009), 'Research on how Mind Map improves Memory'. Paper presented at the International Conference on Thinking, Kuala Lumpur, 22nd to 26th June 2009.

² Farrand, P., Hussain, F. and Hennessey E. (2002), 'The efficacy of the 'mind map' study technique'. *Medical Education*, Vol. 36 (5), pp 426-431.

study reported that the Mind Mapping tool encouraged creative thinking and they became faster at generating and organising ideas for their writing.

How Mind Maps facilitate the learning process

Evidence shows that Mind Maps can facilitate the learning process in a variety of ways:

Interesting and engaging: Goodnough and Woods (2002)⁴ discovered that partakers in their study perceived Mind Mapping as a fun, interesting and motivating approach to learning. Several of these participants attributed the fun aspect to the opportunity to be creative when creating Mind Maps through lots of choice in colour, symbols, key words and design.

Organisation and understanding: Research by D’Antoni and Pinto Zipp (2005)⁵ found that, from a pool of 14 physical therapy students, 10 out of 14 agreed that the Mind Map technique enabled them to better organise and integrate the material presented in their course.

Concentration: A study conducted at Newchurch Community Primary School in Warrington showed a variety of improvements in pupils’ learning after Mind Mapping was introduced. Evidence includes improved concentration, staying on task for longer periods of time, improved questioning and answering during class discussions and improved independence. Cain (2001/2002)⁶.

Mind Maps also promote active learning, foster motivation, improve confidence, and support a diverse range of learning styles and levels of ability – all in a fun way!

Mind Maps as a teaching aid

Mind Mapping provides an effective approach for promoting better understanding in learning and training. Its flexibility also means that it possesses several uses when teaching.

³ Al-Jarf, R. (2009), ‘Enhancing Freshman students’ Writing Skills with a Mind Mapping software’. Paper presented at the 5th International Scientific Conference, eLearning and Software for Education, Bucharest, April 2009.

⁴ Goodnough, K. and Woods, R. (2002), ‘Student and Teacher Perceptions of Mind Mapping: A Middle School Case Study’. Paper presented at the Annual Meeting of American Educational Research Association, New Orleans, 1st to 5th April 2002.

⁵ D’Antoni, A. V., and Pinto Zipp, G. (2005), ‘Applications of the Mind Map Learning Technique in Chiropractic Education’. *Journal of Chiropractic Education*, 19:53-4.

⁶ Cain, M. E. (2001/2002), ‘Using Mind Maps to raise standards in literacy, improve confidence and encourage positive attitudes towards learning’. Study conducted at Newchurch Community Primary School, Warrington.

Using Mind Mapping for lesson planning can help teachers or trainers identify a logical plan or teaching route and increases recall of the subject matter. This can boost teaching confidence and facilitate the smooth running of programmes. Boyson (2009)⁷.

Furthermore Mento et al (1999)⁸ affirm that Mind Mapping is a powerful cognitive tool which can be used in a variety of ways because of its ability to evoke associative and non-linear thinking.

And finally, researchers, Goodnough and Long (2002)⁹ found Mind Mapping to be a useful strategy for introducing new concepts, providing a whole-class focus for a large research project, assessing learning of individuals and offering greater choice in how people chose to complete assignments and projects.

Prepare with a Mind Map

A study by Holland et al (2003/2004)¹⁰ established Mind Mapping to be a valuable technique for helping someone plan and structure projects and assignments more effectively. The experimental subjects in this study were able to improve the structure, coherence and, consequently, the quality of their written work and were able to draw value from the technique for project managing practical work. Testimony that a Mind Map is an invaluable tool for planning and organising your thinking for any project!

Improve your presentations

Mento et al (1999)¹¹ observed that a number of executives made clear and compelling presentations using only a transparency of their Mind Map, without fumbling about with notes. They were also able to handle challenging questions with confidence. Their ability to handle the presented material in such an effective way was attributed to better recall of the information because it had been captured and stored in an integrated, radiating manner rather than linearly. They could also internalise it better because it was their unique representation of the information.

⁷ Boyson, G. (2009), 'The Use of Mind Mapping in Teaching and Learning'. *The Learning Institute*, Assignment 3.

⁸ Mento, A. J., Martinelli, P. and Jones R. M. (1999), 'Mind Mapping in Executive Education: Applications and Outcomes'. *The Journal of Management Development*, Vol. 18, Issue 4.

⁹ Goodnough, K. and Long, R. (2002), 'Mind Mapping: A Graphic Organizer for the Pedagogical Toolbox'. *Science Scope*, Vol. 25, No. 8, pp 20-24.

¹⁰ Holland, B., Holland, L. and Davies, J. (2003/2004), 'An investigation into the concept of Mind Mapping and the use of Mind Mapping software to support and improve student academic performance'. *Learning and Teaching Projects 2003/2004*, pp 89-94.

¹¹ Mento, A. J., Martinelli, P. and Jones R. M. (1999), 'Mind Mapping in Executive Education: Applications and Outcomes'. *The Journal of Management Development*, Vol. 18, Issue 4.

Mind Maps as a tool for collaboration

A Mind Map is an excellent tool for collaborating with others to develop plans or implement key projects. It allows you to harness the input of all members of a group in a dynamic and creative way.

When used for group brainstorming sessions, Mind Mapping was seen to enhance critical thinking and co-operation as well as providing a solid basis for collaborative problem-solving. Groups involved in the sessions reported that they enjoyed expressing their opinions in a participative and open climate (Paykoc et al, 2004)¹².

Improve your writing

Mind Mapping is a powerful tool for assisting any form of writing. In a study by Wai Ling (2004)¹³ 10 out of the 12 involved attributed their improvement in writing to the use of Mind Maps.

Findings from an investigation by Al-Jarf (2009)¹⁴ revealed that the written work produced by using Mind Mapping included:

- More relevant detail and better organised and connected ideas
- Mind Mapping raised the performance of students at all levels of ability as they became more efficient in generating and organising ideas for their writing
- Those studied also displayed a positive attitude towards using Mind Mapping as a pre-writing activity

Organise your thoughts

A Mind Map can help you think with greater clarity to explore relationships between ideas and elements of an argument and to generate solutions to problems. It puts a new perspective on things by allowing you to see all the relevant issues and analyse choices in light of the big picture. It also becomes easier to integrate new knowledge and organise information logically as you aren't tied to a rigid structure.

¹² Paykoç, F., Mengi, B., Kamay, P. O, Onkol, P., Ozgur, B., Pilli, O. and Yildirim, H. (2004), 'What are the Major Curriculum Issues?: The Use of MindMapping as a Brainstorming Exercise'. Paper presented at the First Int. Conference on Concept Mapping, Spain, 2004.

¹³ Wai Ling, C. (2004), 'The Effectiveness of Using Mind Mapping Skills in Enhancing Secondary One and Secondary Four Students' Writing in a CMI School'. University of Hong Kong, Masters dissertation.

¹⁴ Al-Jarf, R. (2009), 'Enhancing Freshman students' Writing Skills with a Mind Mapping software'. Paper presented at the 5th International Scientific Conference, eLearning and Software for Education, Bucharest, April 2009.

Verifying this is research conducted by Mueller et al (2002)¹⁵ describing how the use of Mind Maps to plan patient care at Front Range Community College resulted in enhanced thinking skills including critical thinking, whole-brain thinking and comprehensive thinking.

¹⁵ Mueller, A., Johnston, M. and Bligh, D. (2002), 'Joining Mind Mapping and Care Planning to Enhance Student Critical Thinking and Achieve Holistic Nursing Care'. *Nursing Diagnosis*, 13, 1, pg. 24.

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2. Farrand, P., Hussain, F. and Hennessy E. (2002), 'The efficacy of the 'mind map' study technique'. *Medical Education*, Vol. 36 (5), pp 426-431.
3. Al-Jarf, R. (2009), 'Enhancing Freshman students' Writing Skills with a Mind Mapping software'. Paper presented at the 5th International Scientific Conference, eLearning and Software for Education, Bucharest, April 2009.
4. Goodnough, K. and Woods, R. (2002), 'Student and Teacher Perceptions of Mind Mapping: A Middle School Case Study'. Paper presented at the Annual Meeting of American Educational Research Association, New Orleans, 1st to 5th April 2002.
5. D'Antoni, A. V., and Pinto Zipp, G. (2005), 'Applications of the Mind Map Learning Technique in Chiropractic Education'. *Journal of Chiropractic Education*, 19:53-4.
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11. Mento, A. J., Martinelli, P. and Jones R. M. (1999), 'Mind Mapping in Executive Education: Applications and Outcomes'. *The Journal of Management Development*, Vol. 18, Issue 4.

12. Paykoç, F., Mengi, B., Kamay, P. O, Onkol, P., Ozgur, B., Pilli, O. and Yildirim, H. (2004), 'What are the Major Curriculum Issues?: The Use of MindMapping as a Brainstorming Exercise'. Paper presented at the First Int. Conference on Concept Mapping, Spain, 2004.
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PART 1

RESEARCH STUDIES ON MIND MAPPING

Extended Report

Extended Report - Research Studies on Mind Mapping

As Mind Mapping evolves on a global scale, an ever growing body of research is providing overwhelming evidence that Mind Mapping using Tony Buzan's guidelines works. Here are just some of the exciting results documented in formal and academic papers and drawn from informal studies:

Mind Mapping boosts your memory

The Mind Mapping process involves a unique combination of imagery, colour and visual-spatial arrangement which is proven to significantly improve recall when compared to conventional methods of note-taking and learning by rote.

- A study by Farrand, Hussain and Hennessey (2002)¹⁶ found that Mind Mapping improved the long-term memory of factual information in medical students by 10%. They reported that “Mind Maps provide an effective study technique when applied to written material” and are likely to “encourage a deeper level of processing” for better memory formation.
- Wickramasinghe et al (2007)¹⁷ discovered that the majority of medical students who had been newly introduced to Mind Mapping perceived it to be helpful for memorising information in an organised way compared to their previous self-study techniques.
- Research by Toi (2009)¹⁸ shows that Mind Mapping can help children recall words more effectively than using lists, with improvements in memory of up to 32%.
- Incorporating Mind Mapping into the teaching of comprehension skills enhances students' understanding and memory of comprehension passages (Wong-Ang Gek Moi and Ong Lee Lian, 2007)¹⁹
- Mind Mapping is a helpful method for remembering the relationships and steps that are necessary for mathematical processes (Entrekin, 1992)²⁰.

¹⁶ Farrand, P., Hussain, F. and Hennessey E. (2002), 'The efficacy of the 'mind map' study technique' *Medical Education*, Vol. 36 (5), pp 426-431.

¹⁷ Wickramasinghe A., Widanapathirana, N., Kuruppu, O., Liyanage, I. and Karunathilake I. (2007), 'Effectiveness of mind maps as a learning tool for medical students'. *South East Asian Journal of Medical Education*, Vol.1, No.1 (inaugural issue).

¹⁸ Toi, H (2009), 'Research on how Mind Map improves Memory'. Paper presented at the International Conference on Thinking, Kuala Lumpur, 22nd to 26th June 2009.

¹⁹ Wong-Ang Gek Moi and Ong Lee Lian (2007), 'Introducing Mind Map in Comprehension'. *Educational Research Association (Singapore) 2007*. Study conducted at Compassvale Primary School.

²⁰ Entrekin, V. S. (1992), 'Mathematical Mind Mapping'. *The Mathematics Teacher*, 85, 6, pg. 444, Sept 1992.

- Survey data collected by Mento et al (1999)²¹ indicates that the majority of students appreciated the power and simplicity of Mind Mapping and its “significant advantage over linear note-taking for recall and creative thinking”.

Mind Mapping fosters creativity

Mind Maps really come into their own for encouraging creativity and enabling you to generate new ideas in brainstorming sessions. The spatial layout helps you gain a better overview and makes new connections more visible so you can create an infinite number of thoughts, ideas, links and associations on any topic.

- Mind Mapping was selected as an effective strategy for encouraging creativity development in engineering students and was applied with encouraging results. It allowed creativity development to be introduced into the curriculum in a way that made best use of the time available (Zampetakis et al, 2007)²².
- When Mind Mapping was used as a brainstorming exercise to identify the major curricular issues in Turkey, it was apparent from the outcome that both the quality and quantity of the issues generated had improved. Students reported that the exercise enabled them to perceive all the concerns together as they were related to each other and they enjoyed expressing their opinions within a participative climate. The use of Mind Mapping software also allowed students the freedom to reflect, make changes and develop relationships in line with their thinking process (Paykoc et al, 2004)²³.
- A study by Al-Jarf (2009)²⁴ proves that Mind Mapping software offers a powerful approach for improving the ability of students to generate, visualise and organise ideas. The students involved reported that the Mind Mapping tool encouraged creative thinking and they became faster at generating and organising ideas for their writing.

Mind Mapping enhances learning

Evidence shows that Mind Mapping offers a powerful system for learning. It harnesses visual appeal through colour, symbols and images, and encourages students to make sense out of ideas by constructing them in meaningful ways. This makes it ideal for promoting active learning, fostering

²¹ Mento, A. J., Martinelli, P. and Jones R. M. (1999), ‘Mind Mapping in Executive Education: Applications and Outcomes’ *The Journal of Management Development*, Vol. 18, Issue 4.

²² Zampetakis, L. A., Tsironis, L. and Moustakis, V. (2007), ‘Creativity Development in Engineering Education: The Case of Mind Mapping’ *Journal of Management Development*, Vol. 26, No. 4, pp 370-380.

²³ Paykoç, F., Mengi, B., Kamay, P. O, Onkol, P., Ozgur, B., Pilli, O. and Yildirim, H. (2004), ‘What are the Major Curriculum Issues?: The Use of MindMapping as a Brainstorming Exercise’. Paper presented at the First Int. Conference on Concept Mapping, Spain, 2004.

²⁴ Al-Jarf, R. (2009), ‘Enhancing Freshman students’ Writing Skills with a Mind Mapping software’ Paper presented at the 5th International Scientific Conference, eLearning and Software for Education, Bucharest, April 2009.

motivation, improving confidence, and for supporting a diverse range of learning styles and levels of ability. Students also find it to be great fun!

- A study by Abi-El-Mona and Adb-El-Khalick (2008)²⁵ revealed that science students who used Mind Mapping achieved substantially higher gains in conceptual understanding and practical reasoning than students using conventional study techniques. The personal, student-created structure and nature of Mind Mapping allowed students of different achievement levels to apply it in ways that best corresponded with how they recall information and assimilate their understanding of content.
- Mind Mapping has been shown to bring a renewed sense of enthusiasm to the classroom because it increases student confidence and sense of skill in mastering assigned materials (Mento et al, 1999)²⁶.
- Goodnough and Woods (2002)²⁷ discovered that students perceived Mind Mapping as a fun, interesting and motivating approach to learning. Several students attributed the fun aspect to the opportunity to be creative when creating Mind Maps through lots of choice in colour, symbols, key words and design.
- Survey evidence collected by Budd (2004)²⁸ proves that Mind Mapping engages students in active learning. In particular, students with higher scores for a 'doing' learning style benefited from Mind Mapping activities.
- D'Antoni and Pinto Zipp (2005)²⁹ found that, from a pool of 14 physical therapy students, 10 out of 14 agreed that the Mind Map technique enabled them to better organise and integrate the material presented in their course.
- In a study conducted by Polsen (2003/2004)³⁰, the majority of students emphasised the flexibility that Mind Mapping offered in their learning. In particular, they appreciated the creative aspects of the technique and the assistance it gave them in understanding concepts and ideas. Improved confidence and more positive attitudes towards learning were also apparent.
- Mind Mapping caters to both verbal-linguistic and visual-spatial intelligences through its combination of graphics, symbols and text. As such, it fosters expressive thinking and offers an alternative means for students to share their knowledge and understanding (Goodnough and Long,

²⁵ Abi-El-Mona, I. and Adb-El-Khalick, F. (2008), 'The influence of Mind Mapping on eighth graders' science achievement'. *School Science and Mathematics*.

²⁶ Mento, A. J., Martinelli, P. and Jones R. M. (1999), 'Mind Mapping in Executive Education: Applications and Outcomes'. *The Journal of Management Development*, Vol. 18, Issue 4.

²⁷ Goodnough, K. and Woods, R. (2002), 'Student and Teacher Perceptions of Mind Mapping: A Middle School Case Study'. Paper presented at the Annual Meeting of American Educational Research Association, New Orleans, 1st to 5th April 2002.

²⁸ Budd, J. W. (2004), 'Mind Maps as Classroom Exercises'. *Journal of Economic Education*, Vol. 35, No. 1, pp 35-49.

²⁹ D'Antoni, A. V., and Pinto Zipp, G. (2005), 'Applications of the Mind Map Learning Technique in Chiropractic Education. *Journal of Chiropractic Education*, 19:53-4.

³⁰ Polsen, K. (2003/2004), 'How Do Pupils and Teachers View the Use of Mind Mapping in Learning & Teaching?' G.T.C Scotland Teacher Researcher Programme.

2002)³¹. This is a factor that also makes it beneficial for students who have difficulty with more traditional ways of researching and writing (Peterson and Snyder, 1998)³².

- A study conducted at Newchurch Community Primary School in Warrington showed a variety of improvements in pupils learning after Mind Mapping was introduced. This evidence includes improved concentration, staying on task for longer periods of time, improved questioning and answering during class discussions and improved independence (Cain, 2001/2002)³³.

Mind Mapping supports effective teaching

As a pedagogical tool, the visibility of Mind Mapping provides an effective approach for promoting better understanding in students. Its flexibility also means that it possesses several uses in the classroom.

- Using Mind Mapping for lesson planning can help teachers identify a logical teaching route and increases recall of the subject matter. This can boost teaching confidence and facilitate the smooth running of lessons (Boyson, 2009)³⁴.
- A study by Polsen (2003/2004)³⁵ proved that using Mind Mapping as a pedagogical strategy led to improvements in pupils learning. This was primarily built on helping them to develop sound categorisation skills and then supporting them in depicting this information within a visual format. The study also revealed that the applications and advantages of Mind Mapping have cross curricular qualities, and can be potentially applied across all age ranges and learning abilities.
- D'Antoni and Pinto Zipp (2005)³⁶ recommend that educators incorporate Mind Mapping into their curricula since it is easy to use and involves no cost. There are several options for utilising the technique - 1) pre-lecture format – integrating concepts from assigned readings prior to review by instructor; 2) post-lecture format – integrating concepts from assigned readings and material previously reviewed by instructor; and 3) case presentations.
- Mento et al (1999)³⁷ declare that Mind Mapping is a powerful cognitive tool which can be used in a variety of ways because of its ability to evoke associative and non-linear thinking. It was found to be

³¹ Goodnough, K. and Long, R. (2002), 'Mind Mapping: A Graphic Organizer for the Pedagogical Toolbox'. *Science Scope*, Vol. 25, No. 8, pp 20-24.

³² Peterson, A. R. And Snyder, P. J. (1998), 'Using Mind Maps to Teach Social Problems Analysis'. Paper presented at the Annual Meeting of the Society for the Study of Social Problems, San Francisco, CA, Aug 1998.

³³ Cain, M. E. (2001/2002), 'Using Mind Maps to raise standards in literacy, improve confidence and encourage positive attitudes towards learning'. Study conducted at Newchurch Community Primary School, Warrington.

³⁴ Boyson, G. (2009), 'The Use of Mind Mapping in Teaching and Learning'. *The Learning Institute*, Assignment 3.

³⁵ Polsen, K. (2003/2004), 'How Do Pupils and Teachers View the Use of Mind Mapping in Learning & Teaching?'. G.T.C Scotland Teacher Researcher Programme.

³⁶ D'Antoni, A. V., and Pinto Zipp, G. (2005), 'Applications of the Mind Map Learning Technique in Chiropractic Education'. *Journal of Chiropractic Education*, 19:53-4.

³⁷ Mento, A. J., Martinelli, P. and Jones R. M. (1999), 'Mind Mapping in Executive Education: Applications and Outcomes'. *The Journal of Management Development*, Vol. 18, Issue 4.

especially successful for case teaching, especially in EMBA programmes where students are required to gather, interpret and communicate large quantities of complex information.

- Mind Mapping offers a unique teaching approach when compared to many course exercises and as such it can be used to revitalise a course mid way through its duration (Budd, 2004)³⁸.
- Researchers Goodnough and Long (2002)³⁹ found Mind Mapping to be a useful strategy for introducing new concepts, providing a whole-class focus for a large research project, assessing student learning and offering greater choice in how students complete assignments and projects.
- Using Mind Mapping software in the classroom is a successful way to support children's exploration and presentation of ideas. Ralston and Cook (2007)⁴⁰ found that an exercise involving Mind Mapping software provided a useful focus for pupils to organise their thoughts and to present information clearly and attractively. It also facilitated communication between pupils.

Mind Mapping helps you plan and organise

Evidence shows that Mind Mapping can be used to help you plan and organise your thinking before you start writing or get stuck into a project. You can develop all your ideas and see where they relate to each other before deciding the best way to go about things.

- A study by Holland et al (2003/2004)⁴¹ found Mind Mapping to be a useful technique for helping students plan and structure their essays and projects more effectively. Students were able to improve the structure, coherence and, consequently, the quality of their written work and were able to draw value from the technique for project managing practical work.
- Mind Mapping was successfully applied for action planning to improve team processes within executive education and management development programmes (Mento et al, 1999)⁴².
- Mueller et al (2002)⁴³ describe a case where Mind Mapping is used by student nurses for planning patient care so as to encourage critical, whole-brained thinking when applying the nursing process. The use of Mind Maps in this way resulted in a greater ability to focus on the patient, make connections, see the whole picture and be more creative.

³⁸ Budd, J. W. (2004), 'Mind Maps as Classroom Exercises'. *Journal of Economic Education*, Vol. 35, No. 1, pp 35-49.

³⁹ Goodnough, K. and Long, R. (2002), 'Mind Mapping: A Graphic Organizer for the Pedagogical Toolbox'. *Science Scope*, Vol. 25, No. 8, pp 20-24.

⁴⁰ Ralston, J. and Cook, D. (2007), 'Collaboration, ICT and Mind Mapping'. *Reflecting Education*, Vol. 3, No. 1, pp 61-73.

⁴¹ Holland, B., Holland, L. and Davies, J. (2003/2004), 'An investigation into the concept of Mind Mapping and the use of Mind Mapping software to support and improve student academic performance'. *Learning and Teaching Projects 2003/2004*, pp 89-94.

⁴² Mento, A. J., Martinelli, P. and Jones R. M. (1999), 'Mind Mapping in Executive Education: Applications and Outcomes'. *The Journal of Management Development*, Vol. 18, Issue 4.

⁴³ Mueller, A., Johnston, M. and Bligh, D. (2002), 'Joining Mind Mapping and Care Planning to Enhance Student Critical Thinking and Achieve Holistic Nursing Care'. *Nursing Diagnosis*, 13, 1, pg. 24.

Mind Mapping enhances presentation skills

While researching the applications of Mind Mapping in executive education, Mento et al (1999)⁴⁴ observed that a number of executive students made clear and compelling presentations using only a transparency of their Mind Map, without fumbling about with notes. These students were able to handle challenging questions with confidence. Their ability to handle the presented material in such an effective way was attributed to better recall of the information because it had been captured and stored in an integrated, radiating manner rather than linearly. Students could internalise it better because it was their unique representation of the information.

Mind Mapping promotes group collaboration

A Mind Map is an excellent tool for collaborating with others to develop plans or implement key projects. It allows you to harness the input of all members of a group in a dynamic and creative way. All ideas or statements can be recorded in an appropriate place on the Mind Map and discussed openly at a sensible time.

- Zampetakis et al (2007)⁴⁵ found that students preferred to work with Mind Maps in teams. This allowed them to develop synergistic interaction, assemble collective knowledge and work with group minded attitude. The flow of communication between group members also contributed to the creative process.
- When used for group brainstorming sessions, Mind Mapping was seen to enhance critical thinking and co-operation and provided a solid basis for collaborative problem-solving. Students involved in the sessions reported that they enjoyed expressing their opinions in a participative and open climate (Paykoc et al, 2004)⁴⁶.
- Ralston and Cook (2007)⁴⁷ conducted a study where children were placed in groups and encouraged to create 'consensual' maps using Mind Mapping software. The findings suggest that use of the software played a significant part in promoting meaningful talk and in supporting the children's exploration and presentation of ideas.

Mind Mapping improves writing skills

A Mind Map is a powerful tool for assisting any form of writing. It allows you to get all your ideas and key facts down and at the same time organise them in meaningful ways. The writing process then

⁴⁴ Mento, A. J., Martinelli, P. and Jones R. M. (1999), 'Mind Mapping in Executive Education: Applications and Outcomes'. *The Journal of Management Development*, Vol. 18, Issue 4.

⁴⁵ Zampetakis, L. A., Tsironis, L. and Moustakis, V. (2007), 'Creativity Development in Engineering Education: The Case of Mind Mapping'. *Journal of Management Development*, Vol. 26, No. 4, pp 370-380.

⁴⁶ Paykoç, F., Mengi, B., Kamay, P. O, Onkol, P., Ozgur, B., Pilli, O. and Yildirim, H. (2004), 'What are the Major Curriculum Issues?: The Use of MindMapping as a Brainstorming Exercise'. Paper presented at the First Int. Conference on Concept Mapping, Spain, 2004.

⁴⁷ Ralston, J. and Cook, D. (2007), 'Collaboration, ICT and Mind Mapping. *Reflecting Education*, Vol. 3, No. 1, pp 61-73.

becomes a straightforward matter of reading the Mind Map and writing a sentence or paragraph on each key word.

- Al-Jarf (2009)⁴⁸ investigated the impact of using Mind Mapping software on EFL freshman students' acquisition of English writing skills. The findings revealed that the written work produced by students using Mind Mapping included more relevant detail and better organised and connected ideas than the work of the control group. Mind Mapping raised the performance of students at all levels of ability as they became more efficient in generating and organising ideas for their writing. The students also displayed a positive attitude towards using Mind Mapping as a pre-writing activity.
- A study by Wai Ling (2004)⁴⁹ revealed that most students found Mind Mapping to have considerable value as a pre-writing planning strategy. They believed that it enabled them to plan more organised and systematic points, generate more ideas, order these ideas much easier, improve the clarity of ideas, decide the number and structure of paragraphs to be included and write faster by following the framework of the Mind Map. Altogether 10 out of 12 students attributed their improvement in writing to the use of Mind Maps.

Mind Mapping encourages critical thinking and problem-solving

A Mind Map can help you think with greater clarity to explore relationships between ideas and elements of an argument and to generate solutions to problems. It puts a new perspective on things by allowing you to see all the relevant issues and analyse choices in light of the big picture. It also becomes easier to integrate new knowledge and organise information logically as you aren't tied to a rigid structure.

- Mueller et al (2002)⁵⁰ describe how the use of Mind Maps to plan patient care at Front Range Community College has resulted in enhanced thinking skills including critical thinking, whole-brain thinking and comprehensive thinking. The strategy promotes holistic care planning through focusing on the patient as the centre of the care plan and by enabling interconnections to be made between related nursing diagnoses and patient care data.
- While using Mind Maps to teach Social Problems Analysis, Peterson and Snyder (1998)⁵¹ discovered that the technique had several benefits in helping students build an understanding of basic social science thinking. Mind Maps allowed students to literally "see" the independent, dependent and intervening variables involved in a social problem. They also promoted critical thinking and brought

⁴⁸ Al-Jarf, R. (2009), 'Enhancing Freshman students' Writing Skills with a Mind Mapping software'. Paper presented at the 5th International Scientific Conference, eLearning and Software for Education, Bucharest, April 2009.

⁴⁹ Wai Ling, C. (2004), 'The Effectiveness of Using Mind Mapping Skills in Enhancing Secondary One and Secondary Four Students' Writing in a CMI School'. University of Hong Kong, Masters dissertation.

⁵⁰ Mueller, A., Johnston, M. and Bligh, D. (2002), 'Joining Mind Mapping and Care Planning to Enhance Student Critical Thinking and Achieve Holistic Nursing Care' *Nursing Diagnosis*, 13, 1, pg. 24.

⁵¹ Paper presented at the Annual Meeting of the Society for the Study of Social Problems, San Francisco, CA, Aug 1998.

about appreciation for diverse approaches to the same issue. Furthermore, they permitted effective problem-solving and enabled students to correctly identify where further information was needed.

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PART 2

THE EVIDENCE SUPPORTING MIND MAPPING

Summary Report

Summary Report - The Evidence Supporting Mind Mapping

Radiant Thinking

So why do Mind Maps work? Can't I just stick to my lists and my conventional tried and tested techniques?

In a Mind Map, information is structured in a way that mirrors exactly how the brain functions – in a *radiant* rather than linear manner. It 'maps' out an idea using associations and triggers that extract and connects the information in your head into something visible and structured.

Research shows that the brain likes to work on the basis of *association* and it will connect every idea, memory or piece of information to tens, hundreds and even thousands of other ideas and concepts. Anokhin P.K. (1973)⁵².

Mind Maps make a statement with colour

Sure colour makes documents and Mind Maps look 'prettier,' but are there any other reasons why we should be using it?

- **Capture and engage attention:** 92% believe colour presents an image of impressive quality (Xerox study, 2003).
- **Inform:** Colour improves comprehension by 73% ('The Power of Color', *Successful Meetings*, June 1992).
- **Boost sales:** Colour increases brand recognition by up to 80% (University of Loyola, Maryland study).
- **Improve memory:** 90% believe that they remember presentations and documents better when colour is used (Xerox study, 2003).

The use of images in Mind Maps

Mind Maps use images – Mind Maps *are* images!

⁵² Anokhin P.K. (1973). 'The forming of natural and artificial intelligence'. *Impact of Science in Society*, Vol. XXIII 3.

It is commonly accepted that images convey much more information than a key word or even a whole sentence. But there are other reasons you should use them too:

Memory: Novak (1998)⁵³, Rico (1983)⁵⁴, and Shone (1984)⁵⁵ all point out that the economical way Mind Maps summarise information into visual symbols, helps you to remember that information i.e. the Mind Map can be clearly pictured in your mind's eye.

Creativity: According to Margulies (1991)⁵⁶, before children learn a language, they visualise pictures in their minds which are linked to concepts. Unfortunately, once children are trained to write only words in one colour on lined paper, their creative channels and mental flexibility diminishes. Images keep this creativity fired up.

Impact: A study has proved the benefits of utilising visual elements in presentations and tightly integrating them with words. By comparing visual presentations with verbal presentations, the results were vastly in favour of visualisations. Presenters who used visual language were perceived by the audience as more effective than those using no visuals – they were clearer, more concise, more interesting, more professional, more credible and better prepared.
The Wharton School (1981)⁵⁷

Using key words

Tony Buzan has always been passionate about using key words in Mind Maps rather than phrases or a collection of words. Tony states that a key word is essentially a word that will trigger as much relevant meaning as possible. So by using key words in your Mind Map, you open up your thinking and stimulate your mind to dig deeper and see greater detail on thoughts that were previously vague. This can be a difficult process when the key word is trapped in a sentence. It's also far easier to remember single words and striking headlines than to remember long sentences.

Research on note-making and note-taking conducted by Dr Howe (1970)⁵⁸ revealed that key word notes personally made or given to students were far more effective in terms of the understanding and recall they engendered than complete transcript notes or sentence summary notes.

⁵³ Novak, J. (1998), *Learning, creating and using knowledge. Concept maps as facilitative tools in schools and corporations*. Mahwah: Lawrence Erlbaum.

⁵⁴ Rico, G.R. (1983), *Writing the natural way. Using Right-Brain Techniques to release your expressive powers*. Los Angeles: J.P Tarcher, Inc.

⁵⁵ Shone, R. (1984), *Creative Visualization. New York: Thorsons Publishers Inc.*

⁵⁶ Margulies, S. (1991), *Mapping Inner Space: Learning and Teaching Mind Mapping. Zephyr, Tucson, AZ.*

⁵⁷ The Wharton School (1981), *A Study of the Effects of the Use of Overhead Transparencies on Business Meetings. Wharton Applied Research Center, The Wharton School, University of Pennsylvania.*

⁵⁸ Howe, M.J.A (1970), 'Using students' notes to examine the role of the individual learner in acquiring meaningful subject matter'. *Journal of Educational Research*, 64, 61-3.

Whole brain thinking

Mind Mapping brings together your left brain (words, logic, numbers, linearity) and right brain (curves, colour, creativity, images, space) which dramatically increases your mind power. By using both cortical sides simultaneously you are maximising your brain's potential.

The more you integrate left and right brain activities, the more the brain's performance becomes synergetic. This means that each cortical skill enhances the performance of other areas so that the brain is working at its optimum. Sperry, R.W. (1968)⁵⁹

Associations and connections

Mind Maps are based on associations and connections. Once ideas are displayed in Mind Map form, patterns of thought can be easily examined revealing similarities and linkages between information in different parts of the map.

By encouraging people to link apparently different ideas and concepts in this way, Mind Mapping actually promotes divergent and highly creative thinking. White, R. and Gunstone, R. (1992)⁶⁰

The memory technique of 'chunking'

By gathering and highlighting key branches within a boundary, such as a highlight cloud, you're using a memory technique known as 'chunking'.

Our short-term memory is on average only capable of storing seven items of information and chunking can help us use this storage space more effectively. Glass, A.L. and Holyoak, K.J. (1986)⁶¹

⁵⁹ Sperry, R.W. (1968), 'Hemispheric disconnection and unity in conscious awareness'. *Scientific American*, Vol. 23, pp. 723-35.

⁶⁰ White, R. and Gunstone, R. (1992), *Probing Understanding*. Falmer Press, New York.

⁶¹ Glass, A.L. and Holyoak, K.J. (1986), *Cognition*. New York: Random House.

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PART 2

THE EVIDENCE SUPPORTING MIND MAPPING

Extended Report

Extended Report – The Evidence Supporting Mind Mapping

An ever-growing, substantial body of research supports the effectiveness of using Mind Maps for all sorts of activities including learning, teaching, research, managing projects, organising, solving problems and lots more.

... But what is it exactly that makes Mind Mapping so effective for these pursuits?

The real power of Mind Mapping lies in the way it allows us to think visually. *Visual thinking* taps into multiple aspects of the brain, freeing the mind to understand and process information in ways that go far beyond what can be achieved using linear methods such as lists and tables.

The design of a Mind Map mimics how pathways are established when new or existing information is passed between brain cells i.e. it works just like the brain! Because of this, creating a Mind Map makes it easier and faster to build new connections and recall information. So if you want to be more creative, plan better, solve complex problems, save time, communicate well, accelerate your learning, improve recall or generally perform better all-round, a Mind Map is a great way to go about it.

What is a Mind Map?

A Mind Map is a visual diagram used to record and organise information in a way which the brain finds captivating and easy to process. Thoughts, ideas or facts are laid out around a central theme so that you can clearly ‘see’ their flow across different levels. Unlike linear methods for recording information, a Mind Map doesn’t rely on large amounts of written text but instead uses lines, symbols, key words, colour and images all according to simple, brain-friendly concepts. The technique was invented and popularised by author and ‘brain expert’ Tony Buzan in the 1970s and is now used by millions of people worldwide – in business, at school or at home.

Mind Maps are built around several key elements which have been proven to play an important role in unleashing your thinking capacity.

Radiant, organic structure – works just like your brain

In a Mind Map, information is structured in a way that mirrors exactly how the brain functions – in a *radiant* rather than linear manner. The brain likes to work on the basis of *association* and it will connect every idea, memory or piece of information to tens, hundreds and even thousands of other ideas and concepts (Anokhin, 1973)⁶².

By forcing the brain to go in a linear direction, conventional methods of recording information impede this process. Adding new items to a list or column in a linear sequence actually funnels out your thinking, so as you get lower and lower down the list, your creativity bottoms out and you stop thinking.

⁶² Anokhin P.K. (1973). ‘The forming of natural and artificial intelligence’. *Impact of Science in Society*, Vol. XXIII 3.

Consequently, your potential to get or retain all of the information available to you is limited – not exactly ideal when you're brainstorming, studying or capturing new information!

The concept of Radiant Thinking

Mind Mapping on the other hand, is the external expression of Radiant Thinking and so provides a limitless, more natural and efficient way of using your brain (Buzan and Buzan, 1994)⁶³. Beginning from a central focal point, you can work outwards to record ideas in a random yet organised fashion which matches your brain's thinking patterns. Thick, curved branches are used to lay out your main ideas and progressively thinner sub-branches are then connected to hold secondary levels of thought, sub-topics and supporting data. Using organic, flowing branches matches the visual rhythm of the brain. So by creating a Mind Map, you're literally mapping out your thoughts and ideas!

This is a highly personal activity and is supported by research which shows that individual perceptions play a significant role in assimilating, organising, accommodating and retaining information (Ornstein, 1986, 1991)⁶⁴. The radiant structure of a Mind Map also encourages you to continue thinking for longer – it's much easier to 'see' new opportunities between the branches of your map and your thinking will flow naturally to try and fill in the blank spaces.

Research on learning has uncovered that the connection-building and individual sense-making benefits of Mind Maps are vital to the improved understanding of abstract concepts (Roth & Roychoudhury, 1992)⁶⁵. What's more, the process of manifesting your thinking in a visual way requires a more active level of motivation and involvement (Novak, 1998)⁶⁶. As a result, Mind Mapping promotes more meaningful learning than learning by rote or simply memorising facts and figures. Brain researcher Russell (1979)⁶⁷ adds that "the more you consciously attend to something, the greater will be the depth of processing. The greater the depth of processing, the more meaningful the material becomes".

Basic Ordering Ideas (BOIs) – setting the framework

The main topics that radiate out from the central theme of a Mind Map are known as Basic Ordering Ideas (BOIs). These primary concepts are responsible for shaping and guiding the process of association by setting the basic framework and hierarchy from which ideas can be extended. Ideally, main topics should be generic to provide for a wider range of associations and should sit on thick branches to demonstrate the level of importance of the topic.

⁶³ Buzan, T. and Buzan, B. (1994), *The mind map book: How to use radiant thinking to maximize your brains untapped potential*. Dutton.

⁶⁴ Ornstein, R. (1986), *Multimind: A new way of looking at human behaviour*, Boston: Houghton Mifflin. (1991), *The evolution of consciousness*. New York: Prentice Hall Press.

⁶⁵ Roth, W.M. and Roychoudhury, A. (1992), 'The social construction of scientific concepts or the concept map as conscription device and tool for social thinking in high school science. *Science Education*, Vol 76, 531-557.

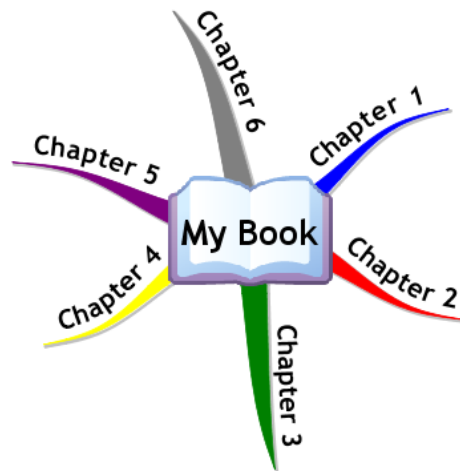
⁶⁶ Novak, J. (1998), *Learning, creating and using knowledge. Concept maps as facilitative tools in schools and corporations*. Mahwah: Lawrence Erlbaum.

⁶⁷ Russell, P. (1979), *The brain book*. New York: Dutton.

A simple way to work out your Basic Ordering Ideas is to consider the following questions:

- What are your specific objectives?
- What information or knowledge do you need?
- What are your key questions – Who?, What?, When? Where? Why? How? Which?
- What are the most important categories you need to look at?
- If you imagine the central theme as a book you are writing, what would your chapter headings be?

Fig - Example of Basic Ordering Ideas



Wycoff (1991)⁶⁸ describes this categorisation process as the essence of creativity and Chuck Frey, author of the Mind Mapping Software Blog (2008)⁶⁹, believes that you can really improve the quality of your Mind Maps by being aware of how to create good BOIs. What's more, by working to make sense out of key ideas and ordering them in a visually meaningful way, you are forced to understand how the partial ideas or concepts that follow are related to a larger whole (Shone, 1984)⁷⁰. Basic Ordering Ideas therefore provide a high-level construct of your subject to help you to think in a naturally structured way, with second and third-level ideas following quickly and easily.

⁶⁸ Wycoff, J. (1991), *Mindmapping: Your personal guide to exploring creativity and problem-solving*. New York: Berkley Books.

⁶⁹ Frey, C. (2008), 'What are basic ordering ideas and how can they improve your mind mapping?'. *Mind Mapping Software Blog*, Dec 18th 2008.

⁷⁰ Shone, R. (1984), *Creative Visualization*. New York: Thorsons Publishers Inc.

Single key words – free up your mind

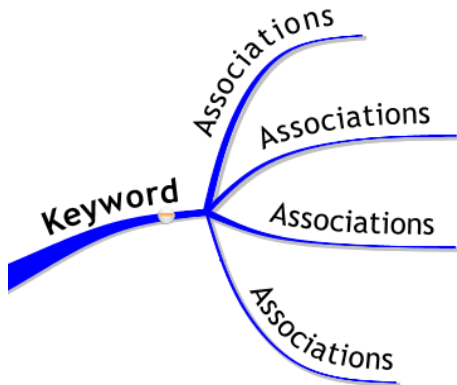
When Mind Mapping, it's recommended that you use single key words or headlines to label branches precisely. A key word is essentially a word that will trigger as much relevant meaning as possible. So by using key words in your Mind Map you open up your thinking and stimulate your mind to dig deeper and see greater detail on thoughts that were previously vague. This can be a difficult process when the key word is trapped in a sentence. It's also far easier to remember single words and striking headlines than to remember long sentences.

In fact, research on note-making and note-taking conducted by Dr Howe (1970)⁷¹ revealed that key word notes personally made or given to students were far more effective in terms of the understanding and recall they engendered than complete transcript notes or sentence summary notes.

Michael Tipper of MichaelonMindMapping.com (2008)⁷² is a firm advocate of using key words. He points out that by trying to choose a word to most appropriately convey a subject, we are forced to think more actively than if we are just copying or gathering information. The discipline of selecting a key word helps to focus the mind on the analysis and processing of the subject whereas there is a tendency to slack on our thinking while using sentences.

All in all, using key words turns note-taking into a selective process which minimises the volume of words written down and maximises the amount recalled from those words.

Fig – A key word triggers numerous associations



⁷¹ Howe, M.J.A (1970), 'Using students' notes to examine the role of the individual learner in acquiring meaningful subject matter'. *Journal of Educational Research*, 64, 61-3.

⁷² Tipper, M. (2008), 'Why do I have to Use Keywords When Mind Mapping?'. MichaelonMindMapping.com, Sept 4th 2008.

Lots of stimulating colour

One of the most vital and fun parts of Mind Mapping is using colour. Colour adds meaning and perspective to your Mind Maps and is a sure-fire way to stimulate creativity, enhance memory and make an impact on how you communicate with others.

Be adventurous and use lots of bold colours in your map to enliven it or as your own special code to separate different themes and organise areas of the map. For instance, you can use one colour for each major category in your map to aid organisation.

Fig – Using different colours for each main topic



Alternatively, you can use colour to 'code' the content of your map, both in relation to conventional interpretations or by using colours that hold personal meaning. For example, when evaluating the success of a department/project/system or conducting an appraisal you could use a 'traffic light' approach where green signifies strengths/positive points, amber represents any areas of development and red denotes weaknesses and problem areas.

There are several research studies that demonstrate the value of colour. For instance, a study conducted by Xerox Corporation and International Communications Research in 2003 uncovered the following results from participants:

- **92%** believe colour presents an image of impressive quality.
- **90%** feel colour can assist in attracting new customers.
- **90%** believe customers remember presentations and documents better when colour is used.
- **83%** believe colour makes them appear more successful.
- **81%** think colour gives them a competitive edge.
- **76%** believe that the use of colour makes their business appear larger to clients.

Other research on the importance of colour:

- **Capture and engage attention** – People make a subconscious judgment about a person, environment, or product within 90 seconds of initial viewing and between 62% and 90% of that assessment is based on colour alone. (Source: CCICOLOR - Institute for Color Research). Colour

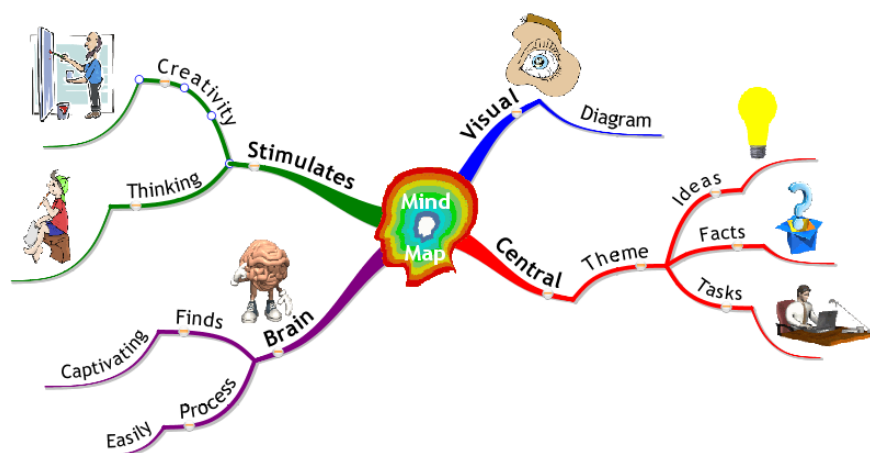
increases motivation and participation. It has been shown to improve readership by as much as 40% (Source: 'Business Papers in Color. Just a Shade Better', *Modern Office Technology*, July 1989). Ads in colour are read up to 42% more often than the same ads in black and white (Source: White, Jan V., *Color for Impact*, Strathmoor Press, April 1997).

- **Inform** – Colour improves learning from 55% to 78% (Source: 'The Persuasive Properties of Color', *Marketing Communications*, Oct 1984). Colour improves comprehension by 73% (Source: 'The Power of Color', *Successful Meetings*, June 1992).
- **Boost sales** - 92.6% place greatest importance on visual factors when purchasing products and 84.7% think that colour accounts for more than half of the various key factors for choosing products (Source: Research conducted by the secretariat of Seoul International Color Expo 2004). Colour increases brand recognition by up to 80% (Source: University of Loyola, Maryland study).
- **Memory** – Psychologists have documented that colour helps us to process and store images more efficiently than colourless (black and white) scenes and remember them better as a result. (Source: *Journal of Experimental Psychology: Learning, Memory and Cognition*, May 2002).

The power of images and icons

Mind Mapping emphasises visual imagery so, to get the best out of the technique, it's highly recommended that you add fun and descriptive pictures, drawings, symbols and doodles to your Mind Maps. Using imagery stimulates the brain's visualising capacity which brings enormous creativity benefits and enhances the memory's storing and recalling capabilities. Have you ever heard the phrase – 'a picture is worth a thousand words'? Images convey more information than any amount of words that you could legibly fit into a single Mind Map so your notes can be as brief and compact as possible. Images can be utilised as a central topic to your Mind Map, to convey a topic or to complement a key word on your Mind Map.

Fig - A Mind Map containing images



Not only does a Mind Map use images, it is an image in itself. In fact Russell (1979)⁷³ and Shone (1984)⁷⁴ all point out that the economical way Mind Maps summarise information into visual symbols helps you to remember that information i.e. the Mind Map can be clearly pictured in your mind's eye.

There is substantial research to highlight the significance of visual imagery:

- **An excellent memory aid** – Our ability to remember images is far better than our memory for words. This picture superiority effect is validated by research undertaken by Anglin, Hossein & Cunningham (2004)⁷⁵. Another study by Ralph Haber (1970)⁷⁶ also supports the value of imagery. Haber showed his subjects a series of 2560 photos. Later, subjects were shown 2560 pairs of photos and asked in each case to identify which photo had been in the original group. The success rate for this test averaged between 85% and 95% showing that humans have an almost photographic memory when it comes to the recognition of pictures. What's more, McArdle (1993)⁷⁷ found that adding visuals like maps or photos to a presentation increases the amount of retained information by as much as 55%.
- **Stimulates associations and creativity** – Images help to focus the brain and make use of a massive range of cortical skills. These include colour, form, line dimension, visual patterning, imagination, logic and spatial awareness. In comparison, conventional linear notes only utilise three basic skills: linear patterning, symbols and analysis (see fig below). Using a wide range of cortical skills provides multiple reference points to draw from and taps into the imagination. This makes images highly

⁷³ Russell, P. (1979), *The brain book*. New York: Dutton.

⁷⁴ Shone, R. (1984), *Creative Visualization*. New York: Thorsons Publishers Inc.

⁷⁵ Anglin, G.J., Hossein, H. and Cunningham, K.L. (2004), 'Visual representations and learning: The role of static and animated graphics'. *Handbook of research on educational communications and technology*, 2nd ed, Mahwah, NJ: Lawrence Erlbaum Associates.

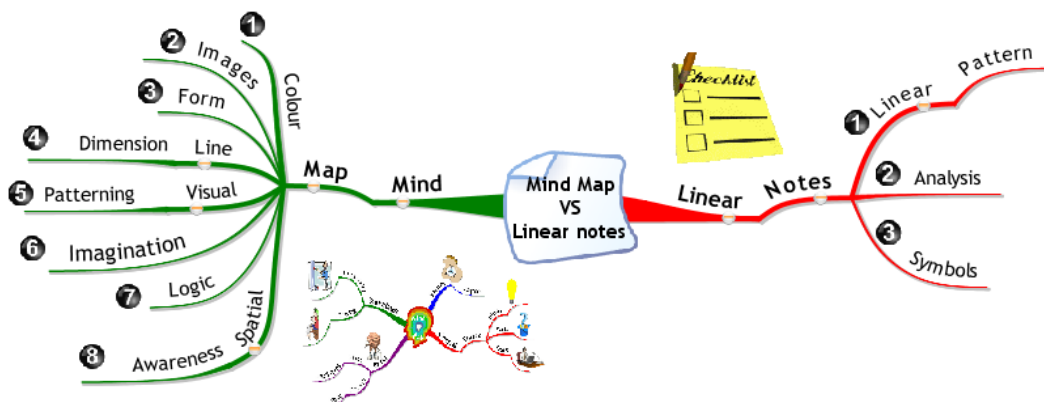
⁷⁶ Haber, R. N. (1970), 'How we remember what we see' *Scientific American*, 222, 104-112.

⁷⁷ McArdle, G.E.H. (1993), *Delivering Effective Training Sessions: Becoming a Confident and Competent Presenter*. Cengage Learning.

potent in triggering a wide range of associations, resulting in more creative thinking. According to Margulies (1991)⁷⁸, before children learn a language, they visualise pictures in their minds which are linked to concepts. Unfortunately, once children are trained to write only words in one colour on lined paper, their creative channels and mental flexibility diminishes.

- **Creates impact** – Words and images together make Mind Maps a rich visual medium for creative expression. The Wharton School (1981)⁷⁹ completed a study that proved the benefits of utilising visual elements in presentations and tightly integrating them with words. By comparing visual presentations with verbal presentations, the results were vastly in favour of visualisations. Presenters who used visual language were perceived by the audience as more effective than those using no visuals – they were clearer, more concise, more interesting, more professional, more credible and better prepared.

Fig - Mind Maps VS linear notes



What about icons?

Icons add clarity and contextual meaning to topics and can be quickly understood by your brain. These small visual symbols (such as ticks, crosses, circles, triangles or more detailed and descriptive symbols etc) reinforce the benefits of using imagery in your maps. They can signify practically anything and will help you make connections between different parts of your maps instantly. For instance, use them to denote priority (A/B/C or 1/2/3), category (e.g. people, projects, processes etc), status (e.g. complete, incomplete), type of activity (e.g. phone calls, meetings etc), hierarchy and other meanings or ideas.

Fig - Using icons in a Mind Map

⁷⁸ Margulies, S. (1991), *Mapping Inner Space: Learning and Teaching Mind Mapping*. Zephyr, Tucson AZ.

⁷⁹ The Wharton School (1981), *A Study of the Effects of the Use of Overhead Transparencies on Business Meetings* Wharton Applied Research Center, The Wharton School, University of Pennsylvania.

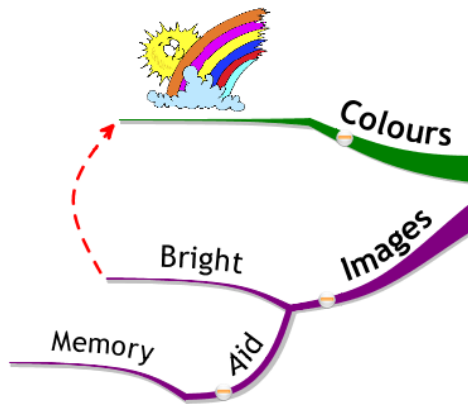


Relationship arrows – making connections

Once ideas are displayed in Mind Map form, patterns of thought can be easily examined revealing similarities and linkages between information in different parts of the map. Relationship arrows can be used to show how these different topics connect with each other across the map.

The arrows will automatically guide your eye and give spatial direction to your thoughts. By encouraging people to link apparently different ideas and concepts in this way, Mind Mapping actually promotes divergent and highly creative thinking (White and Gunstone, 1992)⁸⁰.

Fig – Making a connection across the map with a relationship arrow



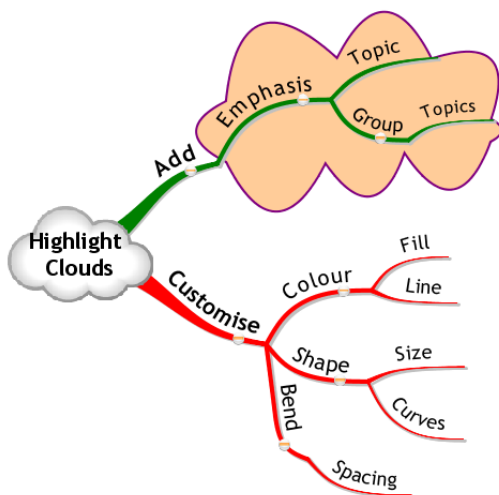
⁸⁰ White, R. and Gunstone, R. (1992), *Probing Understanding*. Falmer Press, New York.

Emphasising and ‘chunking’

Adding highlights or boundaries can make specific topics or ideas in your map stand out visually against the rest of its content. This makes them easier to remember and communicate to others. A highlight or boundary enfolds a topic branch and its sub-branches within an enclosed shape such as a cloud or other outline usually containing a different background colour.

By gathering and highlighting key branches within a boundary, you’re using a memory technique known as ‘chunking’. Our short-term memory is on average only capable of storing seven items of information and chunking can help us use this storage space more effectively (Glass and Holyoak, 1986)⁸¹.

What’s more, a boundary that embraces the branch line creates a unique shape that further enhances the probability of recall. Chuck Frey of the Mind Mapping Software Blog (2009)⁸² stresses that the use of boundaries is invaluable when sharing a Mind Map with other people as it allows you to easily draw attention to key parts of your map, especially when you are working on a larger, more complex Mind Map with many topics and levels of information.



Whole brain thinking

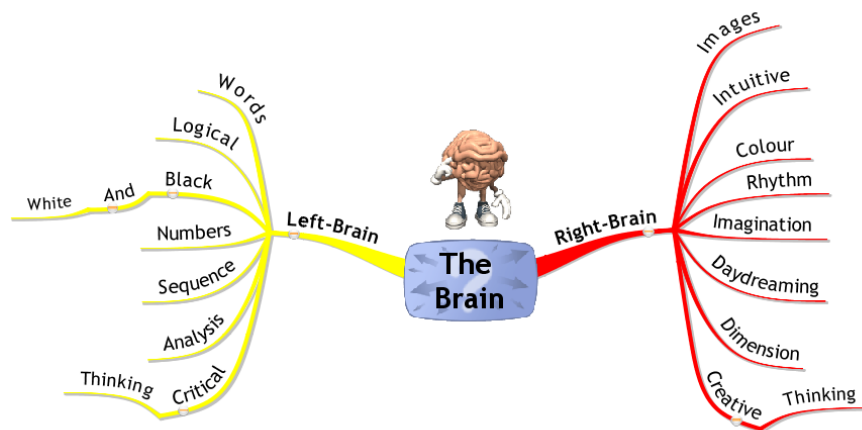
⁸¹ Glass, A.L. and Holyoak, K.J. (1986), *Cognition*. New York: Random House.

⁸² Frey, C. (2009), ‘What are boundaries and how can they increase the effectiveness of your mind maps?’. *Mind Mapping Software Blog*, Jan 21st 2009.

Making use of all of the above elements within a Mind Map results in active engagement of a variety of cognitive functions and processes (Wycoff, 1991)⁸³. Mind Mapping takes into account that the two halves of the brain (right and left) are responsible for carrying out different tasks. This discovery was initially made by Dr Sperry (1968)⁸⁴ who confirmed that the Cerebral Cortex, the ‘thinking cap’ of the brain, is divided into two major hemispheres which perform a range of intellectual (thinking) tasks called cortical skills:

- **The left brain** – This is associated with verbal, logical and analytical thinking. It deals with naming and categorising things, language, reading, writing, arithmetic and symbolic deduction. As well as seeing things in black and white, the left brain is also very *linear* and likes to list things in sequential order with first things coming first, second things second and so on.
- **The right brain** – This operates in a non-verbal way (using images) and excels in dealing with emotions, forms and patterns, colours, rhythm, perceptual and intuitive information. The right brain processes information quickly in a non-linear and non-sequential style. It looks at the whole picture (gestalt thinking) and tries to determine the spatial relationships of all the parts as they relate to the whole. It’s also generally linked with creative thinking and imagination.

Fig – The Brain: Left and Right-brain qualities



⁸³ Wycoff, J. (1991), *Mindmapping: Your personal guide to exploring creativity and problem-solving*. New York: Berkley Books.

⁸⁴ Sperry, R.W. (1968), ‘Hemispheric deconnection and unity in conscious awareness’. *Scientific American*, Vol. 23, pp. 723-35.

Society tends to force us into left-brain thinking and discriminates against the right hemisphere. For instance, conventional methods of teaching concentrate on the left side of the brain far more than the right. Even at work, computers tend to force you to work within specific left-brain confines so you only end up using one side of the brain. However, the ultimate goal for all of us is to adopt a 'whole brain' approach to our life and work as this is how we can tap into the unlimited potential of the brain.

Sperry's research, and that of other researchers who have followed his path, confirms that the more you integrate left and right brain activities, the more the brain's performance becomes synergetic. This means that each cortical skill enhances the performance of other areas so that the brain is working at its optimum.

When you Mind Map, you're using your entire range of cortical skills so you get better clarity and organisation of thinking, more free-flowing ideas and improved concentration and memory. By representing logical structures using an artistic spatial image, a Mind Map essentially connects imagination with structure and pictures with logic (Svantesson, 1992)⁸⁵. On a more specific level, note-taking using key words and radiant hierarchy activates your logical left brain. Add the use of colours, images and space and you also get your creative right brain running!

Research on learning

The discovery on brain hemispheres has brought about an appreciation for the way that people learn and has formed a backdrop for research on teaching and learning such as Gardner's theory of multiple intelligences (1993)⁸⁶. According to this theory, all individuals possess a repertoire of skills including verbal linguistic, musical, logical-mathematical, spatial, bodily kinaesthetic, interpersonal, intrapersonal and naturalist. Individuals differ from one another in the forms of these representations and their relative strengths. As such, Gardner proposes that education should appeal to different intelligences because not everyone learns in the same way.

Mind Mapping can make a huge difference here as it offers students with different learning styles an alternative to the more traditional ways of teaching and learning that some find difficult to master. It's particularly viable for students who experience challenges in their writing and verbal expressive skills as it's a more active, visual form of self-expression (Peterson and Snyder, 1998)⁸⁷.

⁸⁵ Svantesson, I. (1992), *Mind Mapping und Gedächtnistraining*. Bremen: GABAL.

⁸⁶ Gardner, H. (1993), *Multiple intelligences*. New York: Basic Books.

⁸⁷ Peterson, A.R. and Snyder, P.J. (1998), 'Using mind maps to teach social problems analysis'. Paper presented at the Annual Meeting of the Society for the Study of Social Problems, San Francisco, CA, August 1998.

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84. Sperry, R.W. (1968), 'Hemispheric disconnection and unity in conscious awareness'. *Scientific American*, Vol. 23, pp. 723-35.
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PART 3

RESEARCH STUDIES ON MIND MAPPING IN EDUCATION

Summary Report

Summary Report – Research Studies on Mind Mapping in Education

Since Tony Buzan invented Mind Mapping almost 40 years ago, Mind Maps have proved to be a simple but vital aid to learning, and have had amazing success in classrooms all over the world.

Tony's methods have found a willing and eager response from pupils and students of all ages, helping them understand course material, boost memory and recall, generate ideas, assist as a revision aid and help structure coursework .

There has been significant research into the benefits Mind Mapping can bring to the education system, and why they offer such an essential tool for teaching and learning.

The efficacy of the Mind Map study technique

A study conducted by Farrand, Hussain and Hennessey (2002)⁸⁸, aimed to examine the effectiveness of using the Mind Map technique to improve factual recall from written information, looking at whether Mind Mapping overcomes many of the limitations of more conventional study techniques.

Medical undergraduate students participating in the study were exposed to a 600 word passage of scientific text and given three short tests based upon the text to establish baseline data. They were then divided into two groups before being tested again. A week later the students sat a third test to evaluate long-term memory.

Only the Mind Map group maintained their improvement after one week. It was concluded that “Mind Maps provide an effective study technique when applied to written material” and are likely to “encourage a deeper level of processing” for better memory formation.

Mind Maps as a classroom exercise

Mind Mapping is an active and collaborative learning tool that allows an educator to move beyond the traditional ‘chalk and talk’ style of teaching.

Results from an in-class exercise (Budd, J. 2004)⁸⁹ which introduced a group of students to Mind Maps and then a topic to Mind Map, supported the idea that students are engaged in active learning. Students

⁸⁸ Farrand, P., Hussain, F. and Hennessey E. (2002), ‘The efficacy of the ‘mind map’ study technique’. *Medical Education*, Vol. 36 (5), pp 426-431.

⁸⁹ Budd, J. (2004), ‘Mind Maps as Classroom Exercises’. *Journal of Economic Education*, Vol. 35 (1), pp 35-49.

were divided into groups of three to facilitate more in-depth analysis of the topic and to collaborate with others.

In particular, students with higher scores for a 'doing' learning style agreed that they learned a lot from the Mind Map exercise.

The use of Mind Mapping in teaching and learning

In this study by Boyson (2009)⁹⁰ the use of Mind Maps in teaching and learning was examined in three different ways:

1. Using Mind Maps as a note-making tool in developing the teacher's own subject knowledge.
2. Using Mind Maps to present information to students in lessons.
3. Introducing Mind Mapping as a note-making format for students.

From the perspective of the teacher, using Mind Mapping for planning brought about increased understanding of module objective, helped in identifying a logical teaching route and increased recall of the subject matter.

The results of the student survey revealed:

- More than 80% of students agreed that Mind Mapping might help them to remember information.
- 72% of students agreed that Mind Mapping helped them to know how each topic fits into a subject.
- More than 68% said they would use Mind Mapping for revision.
- More than 75% of respondents said they would like to use Mind Maps in other subjects.

⁹⁰ Boyson, G. (2009), 'The Use of Mind Mapping in Teaching and Learning'. *The Learning Institute*, Assignment 3.

Enhancing students' writing skills with Mind Maps

86 students participated in a study (Al-Jarf, R. 2009)⁹¹ designed to test the effectiveness of Mind Map software as a way of improving writing skills. Participants were divided into two groups with one group receiving traditional in-class instruction that depended on the textbook only, while the other group received the same instruction but were encouraged to Mind Map. Before instruction, both groups took the same writing pre-test. Writing instruction was then given over a 12 week period and students in both groups were tested bi-weekly, with a final test at the end of the experiment.

Post-test results showed that the group using Mind Maps made higher gains in writing. They showed more relevant details and better organised and connected ideas. Students thought Mind Mapping was fun and helpful in generating and organising ideas, and enjoyed personalising the maps, resulting in them being able to construct meaningful relationships between ideas in a visual way.

Mind Mapping as a tool in mathematics education

Theory often depicts mathematics as having the structure of a tree with its roots, trunks and branches labelled according to certain sub-disciplines – a Mind Map has a similar format.

Mind Mapping utilises both sides of the brain which can assist mathematical thinking by allowing the development of creativity and spatial ability to balance out the conventional focus on sequential rules and algorithms.

A study conducted in 2003⁹² revealed several uses for Mind Maps in mathematics education including: to organise information; as a memory aid; fostering creativity and to show connections between mathematical concepts.

Feedback from teachers was very positive with many reporting that Mind Mapping was especially beneficial for students who were not good in mathematics as it is through creating a map that they first see connections between mathematical concepts.

⁹¹ Al-Jarf, R. (2009), 'Enhancing Freshman students' Writing Skills with a Mind Mapping software'. *Paper presented at the 5th International Scientific Conference, eLearning and Software for Education, Bucharest, April 2009.*

⁹² Brinkmann, A. (2003), 'Mind Mapping as a Tool in Mathematics Education'. *The Mathematics Teacher*, Vol. 96, Issue 2, pg.96.

Mind Mapping in executive education

Over 70 executive students at an MBA College in Maryland⁹³ completed a questionnaire to ascertain their reactions after being familiarised with Mind Mapping, and having the technique introduced on a practical basis throughout their course.

Results revealed a number of positive findings:

- Majority of students appreciated the powers and simplicity of the technique and its 'significant advantage over linear note taking for recall and creative thinking'.
- Number of executive students made clear and compelling presentations using only a transparency of their Mind Map, without fumbling about with notes.
- These students were able to handle challenging questions with confidence, attributed to better recall of the information because it had been captured and stored spatially, rather than linearly.
- Mind Mapping brought a renewed sense of enthusiasm to the classroom, tending to increase a student's confidence and sense of skill in mastering the assigned materials.

In summary Mind Mapping is a powerful cognitive tool and especially successful where students are required to gather, interpret and communicate large quantities of complex information.

Mind Maps can improve memory

Research into children from the age of 9 – 12 years⁹⁴ examined the difference in the children's recall of a set of words when the Mind Map technique was used in comparison to a list technique.

Preliminary results revealed that the children's memory of words increases in both groups but this increase is significantly higher in the Mind Map group with improvements in memory of up to 32%, providing evidence supporting the notion that using Mind Maps improves recall of words more effectively than using lists.

Mind Mapping and dyslexia

With dyslexics, there is often a challenge to one part of the brain. Mind Mapping can help to revive

⁹³ Mento, A., Martinelli, P. And Jones R. (1999), 'Mind Mapping in Executive Education: Applications and Outcomes'. *The Journal of Management Development*, Vol. 18 (4).

⁹⁴ Toi, H. (2009), 'Research on how Mind Map improves Memory'. *Paper presented at the international Conference on Thinking, Kuala Lumpur, 22nd – 26th June 2009.*

other parts of the brain to make all sections of the mind work together, thereby overcoming the limitations of dyslexia.

Mind Mapping has proved to be an effective means for accelerating the learning of dyslexics. A student who was on track to achieve average results in her final exams was introduced to Mind Mapping and began using the technique initially using solely images to help memorise information. After gaining confidence of memorising maps in this way, the student incorporated more and more words into the Mind Map. The result was that Mind Mapping helped circumvent the dyslexia, with the student achieving results far beyond those expected. (Source: Georgina Kenyon, *Mind Mapping Can Help Dyslexics*. BBC News Online, April 2002).

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PART 3

RESEARCH STUDIES ON MIND MAPPING IN EDUCATION

Extended Report

Extended Report – Research Studies on Mind Mapping in Education

There are numerous studies that can attest to the validity and multiple applications of Mind Maps. Summaries of formal and academic papers, case studies and other informal research are provided here:

The efficacy of the ‘Mind Map’ study technique

Authors: Paul Farrand, Fearzana Hussain and Enid Hennessy

Title: The efficacy of the ‘mind map’ study technique

Publication: *Medical Education*, Vol. 36 (5), pp 426-431

Date/Year: 2002

Purpose

This scholarly paper examines the effectiveness of using the Mind Map technique to improve factual recall from written information. Its focus is on Mind Mapping as a study technique. The paper also looks at whether Mind Mapping overcomes many of the limitations of more conventional study techniques.

Description

50 second and third year medical undergraduate students participated in a study where they were exposed to a 600 word passage of scientific text and given 3 short tests based upon the text. The purpose of the first test was to establish baseline data and the students were then randomly allocated into two groups – half were assigned to a ‘Mind Map’ group and the other half to a ‘self-selected study technique’ group. After a 30 minute interval, both groups were again exposed to the text and were told to use either Mind Map or self-study techniques to learn the material depending on their particular group. The Mind Map group had been trained in the technique during the 30 minute interval. The students were then given a second test after a short distraction task. A week later, the students sat a third test which was used to evaluate the effects of both techniques on long-term memory. Motivation was also tested.

Key Results

A significant improvement in recall of factual material was found in both groups at the second test compared with the baseline (first test). However, only the Mind Map group maintained their improvement after one week with a 10% increase over baseline compared to a 6% increase for those using preferred study methods. This suggests that the Mind Map technique improved long-term memory of factual information in these medical students. However, motivation was found to be higher in the self-selecting group than in the Mind Map group, possibly due to reluctance in students to use what is considered to be a memory strategy as a study aid. The researchers theorise that the improvement within the Mind Map group would have been 13% had motivation for using the technique been higher.

Conclusion

The authors concluded that “Mind Maps provide an effective study technique when applied to written material” and are likely to “encourage a deeper level of processing” for better memory formation. The increased use of Mind Maps within medical curricula should therefore be welcomed. On a cautionary note, it is recommended that consideration is given towards ways of improving motivation amongst users before Mind Maps are generally adopted as a study technique. The authors suggest that effective training is provided so that students are enthusiastic about adopting this approach in preference to other conventional study techniques.

Full paper available at:

<http://www3.interscience.wiley.com/journal/118952400/abstract>

Student and teacher perceptions of Mind Mapping

Authors: Karen Goodnough and Robin Woods

Title: Student and Teacher Perceptions of Mind Mapping: A Middle School Case Study

Publication: Paper presented at the Annual Meeting of American Educational Research Association, New Orleans

Date/Year: 1st to 5th April 2002

Purpose

This paper explores Mind Mapping as an instructional and learning tool for enhancing science teaching and learning. The authors conducted a study over the period of Sept 2000 to June 2001 during which their aims were to:

1. Explore the nature of Mind Mapping as a pedagogical tool.
2. Help grade six students develop the skill.
3. Implement Mind Mapping in a variety of ways in a grade six science curriculum.
4. Ascertain students' perceptions of Mind Mapping after using it for an extended period of time.

Description

The authors performed a qualitative, interpretative case study on the perceptions of 15 students (a grade six class). Training and support was provided to assist the students in mastering the Mind Mapping technique. During the study period, teacher-created maps were used as aids for explaining ideas and concepts. In addition, the students used Mind Mapping in a variety of ways (both individually and in groups) as they participated in an on-line curriculum unit called *Blue Ice*. Several data sources and collection methods were used to gather research information including semi-structured interviews, field notes, an open-ended questionnaire and documents (writing samples, Mind Maps etc).

Key Results

There were several positive outcomes of this study and these can be categorised into four distinct themes:

1. Students perceived Mind Mapping as a fun, interesting and motivating approach to learning. Several students (60%) attributed the fun aspect to the opportunity to be creative when creating Mind Maps (through lots of choice in colour, symbols, key words and design).
2. Students viewed Mind Mapping as having a variety of purposes in learning science.
3. Students preferred to use Mind Mapping in an individual situation rather than within a group, primarily because it allowed for greater individual expression of ideas.
4. The majority of students reported that Mind Mapping enhanced their learning in a variety of ways. They benefited from increased attention, better organised thinking and ideas, a better approach for sharing ideas during assessment and improved note-taking.

The teacher-researcher reported that she also enjoyed using Mind Mapping and believed that it fostered student motivation in learning science. She observed that students who had troubles in written expression became more self-confident and could explain and comprehend concepts through the use of Mind Mapping. From a negative viewpoint, a follow-up questionnaire given to the students a year later revealed that students had not used Mind Mapping in any form since the study. Their reason for non-use was mostly due to lack of teacher suggestion, indicating that some teachers are apprehensive or ambivalent towards using a Mind Mapping strategy.

Conclusion

This study provides some preliminary evidence for the value of Mind Mapping, despite only being conducted on a small scale. The majority of students liked using Mind Mapping and were able to point out several ways in which it enhanced their learning of science. The insight acquired during the research suggests that Mind Mapping will only gain standing in classrooms when it is reinforced either on a yearly basis or across grade level curricula. The authors propose that more research is needed to determine whether the technique is suitable for older or younger learners, whether it is more effective as an embedded assessment tool or a summative assessment tool and whether it has the potential to enhance writing in science.

Full paper available at:

http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1a/96/84.pdf

Mind Maps as a learning technique in Chiropractic education

Authors: Anthony V. D'Antoni and Genevieve Pinto Zipp

Title: Applications of the Mind Map Learning Technique in Chiropractic Education

Publication: *Journal of Chiropractic Education*, 19:53-4

Date/Year: 2005

Purpose

This investigation examined the efficacy of the Mind Map learning technique as a strategy to use in professional chiropractic education. The focus of the research was to obtain pilot data regarding the ability to enhance the integration of knowledge through Mind Mapping and to investigate levels of student satisfaction after using the technique.

Description

A group of 14 third year physical therapy students were enrolled in the study. The students were asked to create a Mind Map on the topic of 'stroke' from the chapter in their textbook and class notes in addition to attending a lecture series on the subject. Students were then instructed to complete their Mind Maps after the lecture series and submit them for review by the course instructor. A non-validated survey was created to record students' perceptions of the usefulness of Mind Maps in improving organisation and integration of the course material.

Key Results

From the pool of 14 students, 10 out of 14 agreed that the Mind Map technique enabled them to better organise and integrate the material presented in the course. Only 2 students disagreed. The remaining 2 students responded neutrally on the subject but agreed that the technique enabled them to identify areas which required further study for them to adequately get a handle on the course material. Through visual analysis of the student's Mind Maps, it was inferred that students had engaged in active learning, as evidenced by the level of integration between the lecture material and course readings.

Conclusion

Although based on a limited educational experience, the data obtained from this study offers some support for the use of the Mind Map learning technique in promoting course material integration and learning in physical therapy education. The authors recommend that chiropractic educators begin to incorporate Mind Maps into their curricula since it is easy to use and involves no cost. They offer several options for utilising the Mind Mapping technique in chiropractic education including: 1) pre-lecture format – integrating concepts from assigned readings prior to review by instructor; 2) post-lecture format – integrating concepts from assigned readings and material previously reviewed by instructor; and 3) case presentations to progress through a clinical case. The authors strongly suggest that sufficient time is spent explaining the theory and rules of Mind Mapping prior to implementation.

Full paper available at:

<http://www.journalchirohumanities.com/Vol%2013/JChiroprHumanit2006-13-2-11.pdf>

Mind Mapping for improving student academic performance

Authors: Brian Holland, Lynda Holland and Jenny Davies

Title: An investigation into the concept of Mind Mapping and the use of Mind Mapping software to support and improve student academic performance

Publication: *Learning and Teaching Projects 2003/2004*, pp 89-94

Date/Year: 2003/2004

Purpose

This report investigates whether the Mind Mapping technique could be used to improve the study and planning skills of second year Digital Media students and first year students on the History of Computing.

Description

Both groups were shown how Mind Mapping could be used to plan the different activities they needed to undertake for their modules and tuition was given on how to use a Mind Mapping software program. The researchers were hopeful that introducing students to the concept of Mind Mapping and related software would help to improve their study skills performance. The rationale for this is that it would provide them with a visual way to plan both essay writing and their practical work. Questionnaires were administered to students at the beginning and at the end of the first semester of the academic year. Focus group meetings were held with both sets of teaching staff and with students at the end of the module to determine staff opinion on the student work quality and the students' perceptions on the effectiveness of the Mind Mapping technique and software.

Key Results

Responses were received from 40 Digital Media students and from 79 History of Computing students. Most students in both groups found the technique useful for organising an essay. Digital Media Students seemed to recognise the benefit of using the technique for project managing their media projects. Both sets of students found the Mind Mapping software both easy to use and useful. The results of the questionnaire were confirmed through further evidence of the effectiveness of the technique gathered from feedback sessions. The module tutors reported that, in general, the standard of student essays had improved over the previous year. Although the number of fail grades did not alter significantly, it was apparent that there were fewer grades at the lower end of the scale and a higher number of very good grades compared to last year.

Conclusion

The project was deemed to be very successful as the technique proved useful in helping the students improve the structure, coherence and therefore the quality of their written work. The authors state that there is clearly scope for Mind Mapping to improve academic performance, both in written and practical work, by providing students with the ability to plan and structure their projects more effectively.

Full paper available at:

<http://wlv.openrepository.com/wlv/bitstream/2436/3707/1/Mind%20mapping%20pgs%2089-94.pdf>

Mind Mapping in executive education

Authors: Anthony J. Mento, Patrick Martinelli and Raymond M. Jones

Title: Mind Mapping in Executive Education: Applications and Outcomes

Publication: *The Journal of Management Development*, Vol. 18, Issue 4

Date/Year: 1999

Purpose

This article explores how the Mind Mapping technique can be applied in executive education and management development. The researchers illustrate the outcomes of using this approach and the reactions of executive students to Mind Mapping.

Description

Students in the Executive MBA (EMBA) programme at Loyola College in Maryland, USA are familiarised with Mind Mapping through an introductory lecture and participation in hands-on exercises facilitated by a professor. In cases where time is limited a packet of Mind Mapping information is provided instead. Mind Mapping is then used on a practical basis throughout the course: 1) For capturing the essence of assigned readings (descriptive Mind Maps); 2) For capturing key insights and concepts from a number of articles (integrative Mind Maps); 3) As an analytical tool for business case studies; and 4) For facilitating discussion of group process data and for action planning to improve team processes. Students were asked to complete a pilot questionnaire to ascertain their reactions to the technique. Responses were received from over 70 executive students.

Key Results

Preliminary data collected from the survey indicated that most of the students appreciated the power and simplicity of the technique and its “significant advantage over linear note taking for recall and creative thinking”. However, some still prefer a top-to-bottom, linear outline approach. Respondents also agreed that Mind Maps used for integrating sets of materials are more valued than Mind Maps used for purposes of description. Instructors observed that a number of executive students made clear and compelling presentations using only a transparency of their Mind Map, without fumbling about with notes. These students were able to handle challenging questions with confidence. Their ability to handle the presented material in such an effective way was attributed to better recall of the information because it had been captured and stored spatially, rather than linearly.

Conclusion

The authors concluded that Mind Mapping is a powerful cognitive tool and that it can be used in a variety of ways because of its ability to evoke associative or non-linear thinking. It was found to be especially successful for case teaching, especially in EMBA programmes where students are required to gather, interpret and communicate large quantities of complex information. Mind Mapping is also believed to bring a renewed sense of enthusiasm to the classroom because it tends to increase a student’s confidence and sense of skill in mastering the assigned materials.

Full paper available at:

<http://www.emeraldinsight.com/Insight/viewPDF.jsp?contentType=Article&Filename=html/Output/Published/EmeraldFullTextArticle/Pdf/0260180405.pdf>

Or...

<http://www.buzanworld.com/userfiles/file/Research%20Papers/Mind%20Mapping%20in%20Executive%20Education%201999.pdf>

Mind Maps as classroom exercises

Author: John W. Budd

Title: Mind Maps as Classroom Exercises

Publication: *Journal of Economic Education*, Vol. 35, No. 1, pp 35-49

Date/Year: 2004

Purpose

This article demonstrates the use of Mind Mapping as an example of an active and collaborative learning tool that instructors can use to move beyond the “chalk and talk”, to encourage responsiveness to a diversity of learning styles, and to re-energise a course mid-semester.

Description

The author describes an in-class exercise in which small groups of students on a Labour Relations course create a Mind Map for a specific topic. At the start of the class session, a brief introduction to Mind Maps is provided along with the topic for the Mind Map. The students are then divided into groups of three and instructed to brainstorm as their first step in creating a Mind Map. The idea of creating Mind Maps in small groups instead of individually is to facilitate more in-depth analysis of the topic through brainstorming and to allow students to communicate and back up their ideas, as well as listen to what others have to say. During the exercise, the instructor circulates among the group to provide encouragement and feedback. An online survey was administered to the students during spring 2002 when the Mind Map exercise was used. The respondents were asked to evaluate various course exercises and also completed Kolb’s learning style inventory to determine whether their learning approach favoured doing, thinking, watching or feeling. The survey response rate was 60% (39 surveys).

Key Results

The survey evidence in the main supports the idea that students are engaged in active learning. In particular, students with higher scores for a ‘doing’ learning style agreed that they learned a lot from the Mind Map exercise. The evidence is also consistent with the belief that Mind Maps cater for individuals with different learning styles. The authors own experience revealed that using a Mind Map exercise is a successful way to re-energise a course mid-semester due to its active and collaborative nature.

Conclusion

Although conducted with a small sample and based on a single course with one instructor, the results validate the theory that Mind Maps are successful for promoting active learning. Mind Mapping is different from many course exercises and can therefore connect with diverse learning styles. It’s uniqueness as an activity can also revitalise a course mid way through its duration. Rather than being an

inclusive teaching method, the author highlights Mind Maps as an option that instructors can consider using as part of a wider repertoire of diverse, active learning exercises.

Full paper available at:

http://www.journalofeconed.org/pdfs/winter2004/35_46Budd_win04.pdf

Mind Mapping for creativity in Engineering education

Authors: Leonidas A. Zampetakis, Loukas Tsironis and Vassilis Moustakis

Title: Creativity Development in Engineering Education: The Case of Mind Mapping

Publication: *Journal of Management Development*, Vol. 26, No. 4, pp 370-380

Date/Year: 2007

Purpose

The purpose of this study was to investigate an effective strategy for introducing the Mind Mapping technique to engineering students based on individual students' preferences. The whole idea was to maximise comprehension and adoption of Mind Mapping and make best use of the available time for tutoring of the technique.

Description

A survey instrument was designed and used to collect student preferences about mind mapping based on four key attributes.

1. Different forms of Mind Maps
2. Different proposed applications of Mind Maps
3. Ways student worked with Mind Maps
4. Different colour patterns

Survey responses were collected from 100 undergraduate second-year students from the Department of Production Engineering and Management. These were analysed using conjoint analysis to determine the contribution of each attribute to the respondent's preference.

Key Results

The results of the survey indicated that an effective strategy to present Mind Mapping to engineering students would be to explain all the 'proposed applications of Mind Maps' with 59.57% of students highlighting it as the most important factor. The students also favoured Mind Maps that contain different colours and both words and drawings to be presented by a lecturer. In addition, the findings revealed that students preferred to work with Mind Maps in teams, enabling them to harness collective knowledge and encouraging the creative process. The results confirmed the findings of Mento et al (1999) in that students reported greater utility for Mind Maps that are used for integrating sets of material as opposed to those used for descriptive purposes.

Conclusion

Based on the results, the researchers concluded that an effective framework to present Mind Mapping to engineering students would involve:

1. Explaining in detail all the possible applications of the technique while also emphasising the use of the technique in constructing integrative maps.
 2. When presenting to students, Mind Maps with different colours should be used (3 was a preferable number) and Mind Maps with words and drawings.
 3. Students should be encouraged to use Mind Maps in teams instead of individual assignments.
- The strategy proposed tries to make the best use of the time available for creativity development programs in engineering departments. The authors also suggest that it can be applied to other creativity enhancing techniques.

Full paper available at:

<http://www.emeraldinsight.com/Insight/viewPDF.jsp?contentType=Article&Filename=html/Output/Published/EmeraldFullTextArticle/Pdf/0260260405.pdf>

The use of Mind Mapping in teaching and learning

Author: Gemma Boyson

Title: The Use of Mind Mapping in Teaching and Learning

Publication: *The Learning Institute*, Assignment 3

Date/Year: 2009

Purpose

This research project aimed to investigate the use of Mind Mapping for teaching and learning with a year 9 group of students. Based on background research, it was anticipated that students would experience Mind mapping as a more stimulating and proactive alternative to passive, linear note-taking and would subsequently find their analytical and memory skills enhanced. Also, early experiences of the teacher researcher had shown that mind mapping was useful in supporting knowledge acquisition and in finding a logical progression through modules.

Description

The use of Mind Maps in teaching and learning was examined in three different ways:

1. Using Mind Maps as a note-making tool in developing the teacher's own subject knowledge. Notes on subjects were made using iMindMap software.
2. Using Mind Maps to present information to students in lessons. A Mind Map created using iMindMap software was presented to students as part of a PowerPoint presentation.
3. Introducing Mind Mapping as a note-making format for students. The teacher presented the Mind Mapping technique to students and challenged them to produce a Mind Map of the module so far during the lesson. The students were also given a second attempt at the task as homework.

Following this task, a survey was used to gauge the group's opinions (22 students) of the technique in comparison to conventional note-taking. A small panel interview was also conducted.

Key Results

From the perspective of the teacher, using Mind Mapping for planning brought about increased understanding of module objective, helped in identifying a logical teaching route and increased recall of the subject matter. This increased teaching confidence and facilitated the smooth running of lessons. The results of the student survey revealed that more than a third of students enjoyed using Mind Maps in class. More than 80% of students agreed that Mind Mapping might help them to remember information and 72% of students agreed that Mind Mapping helped them to know how each topic fits into a subject. More than 68% said they would use Mind Mapping for revision and more than 75% of respondents said they would like to use Mind Maps in other subjects. During the interview, several students said that they had used Mind Maps in other classes since they had been taught about them. Only 2 students responded that they didn't like mind-mapping. This was reflected by the interview panel, who indicated that whilst they like the principles and ideas behind mind-mapping, the actual construction of mind-maps was challenging and time-consuming.

Conclusion

The teacher found Mind Mapping to be an effective method of note-making and arranging thoughts. While some students enjoyed the unique approach of Mind Mapping and the creativity it engendered, a sizeable proportion found the additional effort required to create a Mind Map to be a barrier to their learning. This reaction may have been different if more time was spent introducing and practicing the technique. The teacher suggests introducing Mind Mapping and other note-making methods to students at an early age as it may fit in well with young children's cognitive and writing skills development. It is also implied that Mind Mapping may be more appropriate for students to use for organising their own thoughts during revision, rather than note-taking in a lesson.

Mind Maps for brainstorming on curriculum issues

Authors: Fersun Paykoc, Bunyamin Mengi, Pinar Olgun Kamay, Pinar Onkol, Birikim Ozgur, Olga Pilli and Hamide Yildirim

Title: What are the Major Curriculum Issues?: The Use of MindMapping as a Brainstorming Exercise

Publication: Paper presented at the First Int. Conference on Concept Mapping, Spain

Date/Year: 2004

Purpose

This paper describes a study which sought to identify the major curricular issues in Turkey using the Mind Mapping technique. The specific aims of the task were to map the perceptions and experiences of future curriculum experts and to associate them to the universal context in an integrated and collaborative approach.

Description

The researchers implemented a Mind Mapping process with a small group of six graduate students in the doctorate program at Middle East Technical University.

During the brainstorming activity, the students produced 12 curricular issues - first individually, then as a group. They then contemplated the issues in an integrative approach using a computer based Mind

Mapping program. The software had a flexible nature which enabled the students to reflect, make adjustments and connections in line with their thinking process.

Key Results

It was evident from the outcome of the brainstorming session that both the quality and quantity of the issues improved through the use of the Mind Mapping process. In addition, critical thinking and co-operation was enhanced which provided a solid basis for collaborative problem solving. The students reported that they could see how all the concerns related to each other and said they enjoyed expressing their opinions in a participative and open climate.

Conclusion

Using Mind Mapping to brainstorm and examine major curriculum issues was deemed a successful exercise. Feedback from the process contributed to the improvement of the graduate program and the practice provided the opportunity to engage in a meaningful process of learning.

Full paper available at:

<http://cmc.ihmc.us/papers/cmc2004-069.pdf>

Collaboration, ICT and Mind Mapping

Authors: John Ralston and Deirdre Cook

Title: Collaboration, ICT and Mind Mapping

Publication: *Reflecting Education*, Vol. 3, No. 1, pp 61-73

Date/Year: 2007

Purpose

This study explores the ways that visual material helps children establish shared meanings using an example of collaborative activity within Primary schools. It seeks to answer three questions:

- What are the ways in which multimodal-mapping software can support children's exploration and presentation of ideas?
- How can the maps produced by children be analysed?
- Do samples of the children's talk in group sessions indicate evidence of collaboration and negotiation?

Description

The investigation was conducted over a period of six weeks in two English Primary schools. In each school, approximately 12 children participated (10-11 years of age). The first two sessions focused on introductions and getting to know a Mind Mapping software program, and subsequent sessions focused on map creation for one specific topic. The children worked in groups of three. Data was collected using observational schedules and field notes. The children's maps were analysed using a scoring method based on the use of different features such as icons, label descriptors, links, illustrative use of colour and so forth and by analysing how fully developed each 'node' was i.e. the number of connecting links that nodes in the maps held.

Key Results

The researchers found this exercise to be “useful”. The freedom to explore the use of the software was not a hindrance in completing the task and the “light touch” adopted by the teachers enabled pupils to develop their own solutions to situations. When deadlines were set, students responded quickly and they were able to use the software intuitively. The software provided the opportunity for students to make their own choices when developing the maps and the pupils’ comments showed that they recognised the contribution of ICT. The analysis of the maps showed that children were working with an apparent organising principle in mind although there were sometimes inconsistencies, for example, in the direction of arrows. All the groups were able to complete their maps and solved the problem they had been set by the teacher.

Conclusion

Multi-modal mapping software proved to be successful in supporting the children’s exploration and presentation of ideas, largely because it was flexible and easy to learn. The use of ICT provided a useful focus enabling pupils to organise their thoughts, make use of colour and imagery to present information clearly and attractively. It also facilitated communication between pupils.

Full paper available at:

[http://www.reflectingeducation.net/index.php/reflecting/article/view/index.php?journal=reflecting&page=article&op=view&path\[\]=43&path\[\]=45](http://www.reflectingeducation.net/index.php/reflecting/article/view/index.php?journal=reflecting&page=article&op=view&path[]=43&path[]=45)

The influence of Mind Mapping on Science achievement

Authors: Issam Abi-El-Mona and Fouad Adb-El-Khalick

Title: The influence of Mind Mapping on eighth graders’ science achievement

Publication: *School Science and Mathematics*

Date/Year: 2008

Purpose

This report assesses the influence of using Mind Maps as a learning tool on eighth grade students’ achievement in science and whether such influence was mediated by students’ prior scholastic performance. The study also examines the relationship between different elements of students’ mind maps and their conceptual understanding of the subject.

Description

The participants were 62 students (13 to 14 years of age) enrolled in four sections of a grade 8 science classroom. The students were randomly divided into two groups – an experimental group and a comparison group. The participants in the experimental group received training in Mind Maps and those in the comparison group were provided with a special procedure to organise their notes. Next, the science achievement of the two groups was compared following a month-long intervention in which students in the experimental group used mind maps on a daily basis while those in the comparison group used note summarisation. A multiple choice test was used to measure the students’ gains

following instruction. Two Mind Maps were collected from each participant in the experimental group – one produced early in the study and one toward the end. These were systematically analysed with respect to their geography, central theme and links to major and minor concepts.

Key Results

Analysis of the data indicated that the experimental group participants achieved statistically significant and substantially higher gains than students in the comparison group. Indeed, gains were achieved across all target categories (conceptual understanding and practical reasoning) and levels of achievement (basic, proficient and advanced). On average, students who used Mind Mapping scored about 15 percentage points higher than participants in the comparison group on the target categories of the post-instruction achievement test. The gains of the experimental group were not mediated by participants “prior scholastic achievement”. Interestingly, the data also indicated that iconography was not as central to participants' mind maps as is often theorised. Icons were only used by a small number of participants to represent concepts. Depicting accurate links between central themes and major and minor concepts, and using colours to represent concepts were the major aspects that differentiated the Mind Maps created by students who achieved higher levels of conceptual understanding and those who achieved lower levels.

Conclusion

The results of this study provide empirical support to the theoretical assertions that Mind Mapping has the potential to positively impact student learning in the context of middle school science. The evidence also indicates that the impact of using Mind Mapping did not interact with students' prior achievement levels. The personal, student-created structure and nature of the technique seems to provide students of different achievement levels opportunities to exploit Mind Maps in ways that best correspond with how they recall information, make sense of concepts and integrate their understandings of science content.

Full paper available at:

<http://www.highbeam.com/doc/1G1-189159358.html>

Enhancing students' writing skills with Mind Mapping software

Author: Reima Al-Jarf

Title: Enhancing Freshman students' Writing Skills with a Mind Mapping software

Publication: Paper presented at the 5th International Scientific Conference, eLearning and Software for Education, Bucharest

Date/Year: April 2009

Purpose

This study investigates the impact of using Mind Mapping software for brainstorming, generating and organising ideas on EFL freshman students' acquisition of English writing skills. It also examines whether utilisation of Mind Mapping software has any positive effects on students' attitudes towards writing skill development and the mind mapping activity.

Description

A total of 86 EFL female freshman students participated in the study and these were divided into two groups of 43 students each. One group received traditional in-class instruction that depended on the textbook only (control group) and the other received traditional in-class instruction and was encouraged to Mind Map using a software package (experimental group). Before instruction, both groups took the same writing pre-test. Writing instruction was given over a 12 week period and students in both groups were tested every other week. At the end of the experiment, both groups were tested a final time. The experimental group also answered a questionnaire to determine how the students felt about their experience with the Mind Mapping software.

Key Results

Post-test results showed that the experimental group who used the Mind Mapping software made higher gains in writing. Examination of the paragraphs written in the post-test revealed that students in the experimental group showed more relevant details and better organised and connected ideas than the paragraphs written by the control group. Analysis of the student comments and responses from the questionnaires revealed positive attitudes towards mind mapping and the writing course under study. All of the students found the mind mapping software fun and helpful in generating and organising ideas, and considered it a new way of brainstorming and planning a structured paragraph. They enjoyed being able to personalise the map with their own symbols and designs and were able to construct meaningful relationships between ideas in a visual way. The subjects indicated that the software tool encouraged creative thinking and reported that they became faster in generating and organising ideas for their paragraphs.

Conclusion

The researcher concluded that using Mind Mapping software proved to be a powerful approach for improving students' ability to generate, visualise and organise ideas. Mind Mapping raised the performance of students at all levels of ability. Users also became faster and more efficient in generating and organising ideas for their paragraphs and were able to produce more detail than those who did not use the Mind Mapping software. Students also displayed a positive attitude towards using Mind Mapping as a pre-writing activity. The researcher recommends extending the use of the software to other advanced level writing courses and other language courses such as reading, vocabulary building and grammar.

Full paper available at:

http://adl.unap.ro/else2009/papers/994.1.%20AlJarf_Enhancing.pdf

Mind Maps for critical thinking and holistic nursing care

Authors: Alan Mueller, Mary Johnston and Diane Bligh

Title: Joining Mind Mapping and Care Planning to Enhance Student Critical Thinking and Achieve Holistic Nursing Care

Publication: *Nursing Diagnosis*, 13, 1, pg. 24

Date/Year: Jan 2002

Purpose

This article explores how introducing Mind Mapping as a learning tool for student nurses at Front Range Community College helped them obtain a more holistic view of patients.

Description

Nursing students at the college have been creating Mind Mapped care plans since 1997. The rationale for introducing Mind Mapping was to encourage whole-brain thinking of students which was believed to be inhibited by the use of traditional columnar care plans. Students in the programme learn the technique of Mind Mapping after associated content on the nursing process has been presented. They practice mapping using a non-nursing problem-solving map and translate the skill to planning patient care. The students complete brief Mind Maps of the care they expect to provide for each patient prior to the clinical assignment and a comprehensive mapped plan of nursing care is created during each clinical rotation. Students are required to discuss their preparatory maps with the faculty before caring for patients, thus helping to cement their knowledge and allowing them to examine feasible alternatives. Students also present their comprehensive maps to peers in post conferences.

Key Results

Faculty and student anecdotal data regarding Mind Mapped care plans is very positive. Faculty comments relate to enhanced thinking skills: critical thinking, whole-brain thinking, comprehensive thinking, and patient-centred thinking. Student/faculty dialogue and the use of prescribed colour are viewed as critical components to successful Mind Mapped care plans. Student comments highlight the ability to focus on the patient, make connections, organise, see the whole, and be more creative. Graduates reported that the mapped concepts also translated easily to the linear format required at the workplace.

Conclusion

By uniting the technique of Mind Mapping with care planning, students are encouraged to use critical, whole-brained thinking when applying the nursing process and using nursing diagnoses. The strategy promotes holistic care planning through focusing on the patient as the centre of the care plan and enabling interconnections to be made between related nursing diagnoses and patient care data.

Full article available at:

http://www.accessmylibrary.com/coms2/summary_0286-9128957_ITM

Mind Mapping as a tool in qualitative research

Authors: Chris Tattersall, Ann Watts and Stephen Vernon

Title: Mind mapping as a tool in qualitative research

Publication: *Nursing Times*, Vol. 103, No. 26, pp 32-33

Date/Year: 2007

Purpose

This article draws attention to the idea of using Mind Mapping as a tool in qualitative research. It describes the concept of Mind Mapping for phenomenological studies with the aim of prompting further research and discussion.

Description

Theoretically, Mind Mapping can enable researchers to rapidly make valid transcriptions of interviews and may assist in analysis of qualitative data by allowing researchers to 'bracket' their own misconceptions. The researcher explored the potential of using Mind Mapping for the following activities: Transcribing; Bracketing and Analysis of qualitative data.

Key Results

The author believes that the biggest potential lies in using Mind Mapping as a real-time transcribing tool, especially when the researcher is an observer of an interaction. Usually integrating transcribed text with notes on non-verbal aspects of an interview can require a good deal of time and effort. Mind Mapping may assist in this regard by allowing researchers to quickly transcribe non-verbal aspects and verbal aspects of an interaction in an integrated manner. If conducted correctly, Mind Mapping could allow a free and unrestricted thought process which awakens possibilities and clears the mind of preconceived ideas about the subject. Analysis of qualitative data may be more effectively integrated with the process of transcribing through the use of Mind Mapping. Greater creative thinking can allow links to be made between themes or statements in real time as the transcribing is going on. There is also a potential time-saving benefit from there being a short delay between interview, transcription and analysis.

Conclusion

Mind Mapping may allow researchers to transcribe non-verbal as well as verbal aspects of an interaction in real time, giving a realistic interpretation of all aspects of the interaction. Mind Mapping may also assist the researcher in the analysis of data by providing the ability to 'bracket' their own preconceptions. The author recommends that further research and discussion is initiated on the use of Mind Mapping as a tool in qualitative research so as to expand and possibly corroborate its use.

Full article available at:

<http://www.nursingtimes.net/nursing-practice-clinical-research/mind-mapping-as-a-tool-in-qualitative-research/199503.article>

Mind Mapping in learning and teaching: Pupil and teacher perspectives

Author: Keith Polsen

Title: How Do Pupils and Teachers View the Use of Mind Mapping in Learning & Teaching?

Publication: G.T.C Scotland Teacher Researcher Programme

Date/Year: 2003/2004

Purpose

This research offers a detailed evaluation of the ways in which Mind Mapping can be used as a teaching and learning tool, taking into account pupil and teacher perceptions of its uses and usefulness.

Description

Mind Mapping was explored in two S2 classrooms (57 students, aged 12-13) as a pedagogical tool for enhancing history education over a 6 month period. The author adopted an exploratory approach to the study which involved examining the practice in two Scottish Secondary Schools – Oban High School and Galashiels Academy. It was used by teachers to explain historical ideas and concepts and by pupils to record information, demonstrate and develop understanding. Methods of research used with students included semi-structured interviews, survey questions, field notes, an open-ended questionnaire, exemplars (pupil generated documents). The methodology used with teachers included interviews for exploring their perceptions, the author's own views and those gauged from teachers who did not participate in the study.

Key Results

The evaluation of pupils' perceptions of mapping after using it over a six month period revealed that:

1. Students perceived mapping as an enjoyable, interesting and motivating approach to learning.
2. Pupils viewed mapping as having a variety of uses in learning history and many highlighted the flexibility of approach that it offered in their learning.
3. The majority of students reported that mapping enhanced their learning in a variety of ways. In particular, they appreciated the creative aspects of the technique and the assistance it gave them in understanding concepts and ideas. Improved confidence and more positive attitudes towards learning were also apparent.

Teachers reported a number of benefits in using mapping for both teaching and learning. Some of the learning gains identified included improved thinking skills, subject specific understanding, preparing for writing, confidence, self-image and attitudes to learning. The visibility and of the technique promoted better understanding of subjects and its flexibility meant that it possessed several classroom uses. Improvements in pupils' learning were primarily built on helping them to develop sound categorisation skills and then supporting them in depicting this information within a visual format.

Some difficulties were reported in incorporating the technique into students' learning yet overall mapping was valued as a pedagogical strategy by all the teachers who participated in the study.

Conclusion

As long as they adhere to categorisation, Mind Maps are perceived by teachers and students alike as being a useful and relevant tool for teaching and learning. The author suggests that this may be because Mind Maps mirror the cognitive processes that all human beings go through in constructing understanding. The applications and advantages of Mind Mapping seem to possess cross curricular qualities, and can potentially apply across age ranges, as well as the spectra of learning abilities.

Full paper available at:

http://www.gtcs.org.uk/Research_/TeacherResearcherProgramme/TeacherResearcherReports/mind_mapping_in_learning.aspx

Mind Mapping for enhancing students' writing

Author: Chan Wai Ling

Title: The Effectiveness of Using Mind Mapping Skills in Enhancing Secondary One and Secondary Four Students' Writing in a CMI School

Publication: University of Hong Kong, Masters dissertation

Date/Year: 2004

Purpose

This study investigated the effectiveness of using Mind Mapping as a pre-writing planning strategy within second language writing classrooms.

Description

The subjects of the study were two classes of secondary 1 (S1) and secondary 4 (S4) students in a band two CMI (Chinese Medium) school in Hong Kong. An action research approach was undertaken so that the researcher could collect and analyse qualitative data that would provide a reflective understanding of the subject and bring about an improvement in practice. A questionnaire survey was administered to the two classes to gather personal information including background, planning habits and their own perceptions of their writing ability. Students in the two classes were then categorised into good, average and poor writers based on the results of the writing paper in their first term examination.

So that before and after comparisons could be made, the piece of composition of each student was collected before the Mind Mapping exercise was conducted. Students were trained to use Mind Mapping over the course of two English lessons and were then asked to write two pieces of compositions over two writing sessions. Students were required to plan their writing by drawing a Mind Map. All three pieces of compositions produced by the students before and after the intervention were rated by three English teachers, including the researcher. 6 students (two good writers, two average writers and two poor writers) were randomly selected from each class to be interviewed on their perception of the usefulness of the exercise.

Key Results

The ratings of the compositions revealed that students' writing showed a gradual improvement after the Mind Mapping exercise. This was evident in both classes. The findings also indicate that the three ability groups in each class (good, average and poor) improved simultaneously after the Mind Map training session, with Mind Mapping having a more positive impact on the quality of the good writers. However, the intervention was not able to narrow the differences within the three groups at this particular stage. Analysis of the individual interviews revealed that most students agreed that Mind Mapping had considerable value in helping them with the planning of their compositions. Summing up the students' opinions, they believed that with the use of Mind Mapping they could:

1. Plan more organised and systematic points.
2. Generate more ideas.
3. Order these ideas much easier.
4. Improve the clarity of ideas.
5. Decide the number and structure of paragraphs to be included.
6. Write faster by following the framework of the Mind Map

Five out of six S1 students and five out of six S4 students attributed their improvement in writing to the use of Mind Maps.

Conclusion

The findings suggest that the utilisation of Mind Mapping would be an effective pre-writing planning strategy for student writers to adopt. To a large extent, it has been shown that Mind Mapping skills can improve the quality of students' writing. It is worthwhile introducing this planning technique to students at junior and intermediate levels so that they can benefit from a good use of planning from an earlier stage. Senior form students could also be taught Mind Mapping skills so that they can apply the technique in different writing tasks. Any teaching of Mind Mapping should be undertaken with the aim of encouraging students to generate and arrange key ideas in an integrated way. Although the study has provided meaningful data for the researcher, the results should also be complemented by further studies with a larger sample population.

Full paper available at:

[http://hub.hku.hk/handle/123456789/31749?mode=full&submit_simple= Show+full+item+record](http://hub.hku.hk/handle/123456789/31749?mode=full&submit_simple=Show+full+item+record)

Using Mind Maps to raise standards in literacy and improve confidence

Author: Maureen E. Cain

Title: Using Mind Maps to raise standards in literacy, improve confidence and encourage positive attitudes towards learning

Publication: Newchurch Community Primary School, Warrington

Date/Year: 2001/2002

Purpose

This study explored how to improve children's learning and emotional development by using Mind Maps as a teaching and learning practice. The specific aims of the project were to:

- To improve children's confidence and develop a 'can-do' culture through the school.
- To develop a visual and kinaesthetic approach to teaching and learning.
- To motivate pupils and teachers through a different approach to learning.

Description

The research involved two groups of children from Year 3 (5 children) and Year 5 (6 children). The project began with questionnaires which identified all of the children as having visual and kinaesthetic learning preferences. Two teachers were involved with support by a mentor. The study took place over the course of a school year beginning in Sept 2001 and ending in July 2002, and was carried out during

literacy lessons and other lessons where appropriate. The children were encouraged to use a Mind Mapping process for planning their stories, recall of information, creating individual profiles and self-evaluation of learning throughout the week. Much of the research was conducted by observing children in their normal everyday lessons. Other methodology included assessments and interviews. During interviews the children were invited to talk about the findings from the questionnaires and were involved in one-to-one conferencing to discuss their Mind Maps.

Key Results

The work of both groups was assessed throughout the year and the evidence suggests that the children improved in all the areas identified, including:

- Improved concentration.
- Staying on task for longer periods of time.
- Improved questioning and answering during class discussions.
- Becoming more self-reliant on their own resources.
- Improving independence.

The teachers commented on how well the children were able to organise their thinking and make connections between the 'branches'. All the children in the groups felt positive about completing their mind-maps and showed enthusiasm over and above the level that is normally present in other aspects of their work.

Conclusion

The comments from the children clearly reflected a highly developed analysis of their own learning. The children continue to use a Mind Mapping approach for their planning and organisation of tasks which is testimony to the success of the project. The teachers have also incorporated this style of teaching into their practice. The research project has paved the way for further developments in teaching for learning and has positively impacted the school culture.

Full paper available at:

<http://www.standards.dcsf.gov.uk/ntrp/publications/cain/>

Effectiveness of Mind Maps as a learning tool for medical students

Authors: Amila Wickramasinghe, Nimali Widanapathirana, Osuka Kuruppu, Isurujith Liyanage and Indika Karunathilake

Title: Effectiveness of mind maps as a learning tool for medical students

Publication: *South East Asian Journal of Medical Education*, Vol.1, No.1 (inaugural issue).

Date/Year: 2007

Purpose

This original research paper evaluates the effectiveness of using Mind Maps as a self-learning method for new entrants to the Faculty of Medicine, University of Colombo, Sri Lanka.

Description

74 new entry medical students were randomly selected and assigned to two equal groups based on their high school performance. One group was to use Mind Mapping for the research task and the other was to use a self-selected study technique. The Mind Map group was given a 30 minute lesson in the technique. Following this training, both groups were exposed to a text on iron deficiency anaemia for a 45 minute period. They were then asked to answer four structured essay questions based on the study text. Students' perception regarding the technique was obtained from the Mind Map group using a self-administered questionnaire. The Mind Maps prepared by students were evaluated using a scoring method which took into account the map's structure as well as its content. The answers for the exercise were marked using a pre-prepared marking scheme.

Key Results

Analysis of the data revealed that there was no significant difference between the marks of the two groups. However, the majority from the Mind Map group (97.1%) felt that using the technique was useful to summarise information and 87.9% expressed an interest in learning more about it. Most students also perceived it to be helpful in memorising information in an organised way compared to their previous self-study techniques.

Conclusion

The researchers concluded that the Mind Mapping technique did not show any obvious advantage over other conventional study techniques as a short-term learning method for new students. Despite this, the majority of students in the relevant group perceived it as a useful learning tool. Given that the students were exposed to the technique for the first time, the initial results and the students' positive comments are encouraging for promoting the use of Mind Mapping as an effective self-learning tool. The researchers suggest that further studies should be undertaken to evaluate its effectiveness in retaining information in the long-term.

Full paper available at

http://www.md.chula.ac.th/jmet/articleVol1No1/OR4_Amila%20Wickramasinghe.pdf

Using Mind Maps to teach social problems analysis

Authors: Anne R. Peterson and Paula J. Snyder

Title: Using Mind Maps to Teach Social Problems Analysis

Publication: Paper presented at the Annual Meeting of the Society for the Study of Social Problems, San Francisco, CA

Date/Year: Aug 1998.

Purpose

This paper discusses the use of Mind Maps as a possible solution for overcoming the difficulties in teaching the analysis of social problems. The results of using Mind Maps at Columbus State Community College are presented.

Description

In the Social Problems course at the College, the authors recommend the following four steps for constructing Mind Maps:

1. Preparation – Students must do background reading and research on a social problem that is of interest to them.
2. Brainstorming – Students write down all the causes and consequences related to the social problem they've chosen to investigate and then identify the one cause and one consequence that is central to their topic.
3. Revision – Students revise their initial drafts, for example, by drawing arrows to link related concepts and rearranging items that do not fit together
4. Presentation – Students present their Mind Maps to the rest of the class for shared understanding and evaluation.

Key Results

Positive and negative outcomes were found. Notably, Mind Mapping helped to solve some of the challenges of teaching a Social Problems course. The key benefits were:

1. Students could develop a broader conceptualisation of a social problem.
2. It permitted effective problem-solving and enabled students to identify where further information may be required.
3. It helped to build an understanding of basic social science thinking. Students' could literally "see" the independent, dependent and intervening variables involved in a social problem.
4. It offered an alternative mode of expression for students who have difficulty with more traditional ways of researching and writing.
5. It promoted critical thinking and brought about appreciation for diverse approaches to the same issue. In essence, students could "learn how to learn more effectively".

From a negative angle, some students displayed resistance to the assignment because Mind Mapping was unfamiliar to them. It requires practice and encouragement to achieve real gains from this technique. As a result, these students submitted poor quality maps, most likely due to their "low-level involvement". When presented with the technique, some faculty members were also apprehensive to exploit Mind Mapping due to a preference for more traditional ways of teaching.

Conclusion

The authors concluded that Mind Mapping proved to be an excellent method for the College to teach the basic concepts of the Social Problems course and to encourage critical thinking, problem-solving, communication skills and interpersonal skills. However, Mind Mapping cannot be universally applied unless people (students and faculty) can see its value, particularly as it requires preparation and patience. For those who think it is an appropriate technique for teaching a Social Problems course, the authors suggest a series of steps for introducing Mind Mapping to a College.

Full paper available at:

http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/17/09/87.pdf

Mind Mapping as a tool in Mathematics education

Author: Astrid Brinkmann

Title: Mind Mapping as a Tool in Mathematics Education

Publication: *The Mathematics Teacher*, Vol. 96, Issue 2, pg.96

Date/Year: Feb 2003

Purpose

This paper explores the suitability of Mind Mapping as pedagogical tool for mathematics education and discusses its possible applications within the field, as well its advantages and limitations.

Description

The author points out that a Mind Map is structured similarly to mathematics. Theory often depicts mathematics as having the structure of a tree with its roots, trunk, branches and twigs labelled according to certain sub-disciplines – a Mind Map has a similar format. As such, the author believes that this enables Mind Maps to be used for helping people to visualise relationships between mathematics in a structured way that corresponds to the structure in mathematics. Mind Mapping utilises both sides of the brain and this can assist mathematical thinking by allowing the development of creativity and spatial ability to balance out the conventional focus on sequential rules and algorithms. As part of the research, the author sought feedback from teachers at various academic levels.

Key Results

Several uses were identified for Mind Maps in mathematics education including: to organise information, as a memory aid, to foster creativity and show connections between mathematics and non-mathematical concepts. From a negative standpoint, it was pointed out that that a Mind Map may sometimes appear confusing. This is largely because Mind Maps are very individual graphic representations and different people have different associations with the same topic.

Feedback from teachers was generally very positive. Many reported that Mind Mapping was especially beneficial for students who were not good in mathematics as it is through creating a map that they first see connections between mathematical concepts. The author's own experiences using Mind Mapping in the classroom revealed that it is easy to learn and that students see it as a welcome change in mathematics lessons.

Conclusion

The author believes that the various positive learning effects of using Mind Mapping should result in enhanced use of this method in mathematics education. In particular, Mind Mapping assists mathematical thinking, helps students organise their knowledge and makes their knowledge structure visible. Mind Mapping also fosters creativity which has a positive effect on mathematical achievement.

Full paper available at:

http://www.nctm.org/eresources/article_summary.asp?URI=MT2003-02-96a&from=B

Mind Maps for reading with understanding

Authors: Cindy Oh, Hariati Ali, Adeline Enriquez, Ilyana Bte Mohd Anwar, Hazel Lim, Law Ee Peng, Leong Pei Ying, Helen Lim and Wee Chiu Mei

Title: Reading With Understanding Through The Use of Mind Maps

Publication: Study conducted at CHIJ Our Lady of the Nativity School

Purpose

This study explores the use of Mind Maps as a strategy for helping pupils improve their understanding when reading a comprehension passage. It came about following the discovery that, while many Primary One pupils (7 years old) were able to read a passage, they were unable to demonstrate adequate understanding of the passage afterwards.

Description

8 primary classes (all Primary One pupils) were involved in the project. Two classes were of higher ability and one was of lower ability, and the rest were mixed abilities. A pre-test was carried out to measure the pupils' abilities to understand the chosen passage. The pupils were first taught how to Mind Map and were then given reading passages to complete as part of a weekly Mind Map exercise. A total of 4 passages were chosen to be completed once a week with pupils working in groups of six. At the end of the 4 sessions, a post-test was given to find out if the pupils had benefited from using Mind Maps.

Key Results

This project is still in progress and the post-test has yet to be administered. However, the results of the pupils' work so far and teachers' observations indicate that many pupils are showing signs of improvement in their ability to answer comprehension questions.

Conclusion

If the results of the post-test are shown to be favourable, the teachers' will recommend that the use of Mind Maps be stipulated in the English Scheme of Work for teaching comprehension for teaching Primary One and Primary Two pupils. They also advise that teachers of other levels try using a Mind Map strategy and explore other methods to help improve pupils' understanding of reading passages.

Mind Maps for enhancing reading comprehension

Authors: Mrs Wong-Ang Gek Moi and Mrs Ong Lee Lian

Title: Introducing Mind Map in Comprehension

Publication: *Educational Research Association (Singapore) 2007*, Study conducted at Compassvale Primary School

Date/Year: 2007

Purpose

This research paper examines the use of Mind Mapping as a tool in teaching comprehension skills to pupils. The key aims of the research were to help pupils understand and remember text passages better, develop pupils' general thinking skills and enhance pupil confidence in attempting comprehension questions.

Description

Two Primary 4 classes (10 years old) of mixed ability took part in this project, one class held 33 pupils and the other 34 pupils. It was conducted over a period of 10 weeks and three sub-units of the current Chinese syllabus were selected as the comprehension passages to be studied. For the first three sessions, the teachers explained the vocabulary along with teaching pupils how to form a Mind Map. Under the teachers' guidance, the pupils then started to revise and summarise the content of the comprehension passages in Mind Map form while working in groups of 5 or 6. A pre and post-test were carried out for each of the three comprehension passages that were studied. During each test, pupils answered the same 4 comprehension questions based on each passage. The teachers involved in the study provided feedback on the pupils' learning interest and attitudes towards Mind Mapping as a learning style and direct responses were also sought from selected pupils.

Key Results

Analysis of the test results revealed that there were overall improvements in all the post-tests conducted. The teachers' commented that mapping out the contents of a passage helped pupils to overcome the phobia of lengthy passages and raised their ability to comprehend the content. It was noted that pupils showed better understanding as they were able to see the relationship of the content visually and retrieve answers or key words from the Mind Map when answering the questions. The majority of pupils displayed eagerness in using Mind Maps, making the classroom environment livelier. Feedback from the pupils revealed that they found Mind Mapping useful for organising information and more straightforward in helping them to understand the passage. They were also able to remember important information better. Due to the group dynamics at play, it was felt that the results of the experiment would have been more accurate if all pupils were to perform the Mind Map activities individually.

Conclusion

Incorporating Mind Mapping into the teaching of comprehension skills enhances student's understanding and memory of comprehension passages.

Full paper available at:

<http://conference.nie.edu.sg/2007/paper/papers/LAN469.pdf>

How Mind Maps improve memory

Author: Henry Toi

Title: Research on how Mind Map improves Memory

Publication: Paper presented at the International Conference on Thinking, Kuala Lumpur

Date/Year: 22nd to 26th June 2009

Purpose

This research examines the difference in children's recall of a set of words when the Mind Map technique is used in comparison to a list technique.

Description

The subjects of the study were Singaporean children aged 9, 10, 11 and 12 years. They were divided into two groups – a control group and a Mind Map group. The control group were given a list of 30 words relating to a subject that they were familiar with. The Mind Map group were given exactly the same words, but organised in Mind Map format using Mind Mapping software. The study was conducted over time intervals of 1 hour, 2 hours, 6 hours, 1 day and 7 days.

Key results

The research is still ongoing. Preliminary results reveal that the children's memory of words increases in both groups but this increase is significantly higher in the Mind Map group with improvements in memory of up to 32%.

Conclusion

Using Mind Maps improves recall of words more effectively than using lists.

Mind Mapping and Dyslexia

Author: Georgina Kenyon

Title: Mind Mapping Can Help Dyslexics

Publication: *BBC News Online*

Date/Year: 14th April 2002

Purpose

This news article outlines a case study of Ms Elaine Colliar, a dyslexic who used Mind Mapping to help her achieve at school and university. Ms Colliar is now a Mind Mapping champion and a Scottish accelerated-learning trainer.

Description

At school, Ms Colliar was on track to achieve average results in her final exams until she was introduced to Mind Mapping. She began using Mind Maps consisting solely of images to help her memorise information. As she gained confidence that she could memorise in this way, she gradually incorporated more and more words into her Mind Maps.

Key results

Ms Colliar found that Mind Mapping helped her circumvent her dyslexia to achieve results at school and university that were far beyond those she expected. With dyslexics, there is often a challenge to one part of the brain. Mind Mapping can help to revive other parts of the brain to make all sections of the mind work together, thereby overcoming the limitations of dyslexia. Ms Colliar now teaches Mind Mapping to students. Out of a group of 13 students she tutored through A-levels, four were dyslexic. All students are now at university.

Conclusion

Mind Mapping is effective for accelerating the learning of dyslexics.

Full article available at:

<http://news.bbc.co.uk/1/low/education/1926739.stm>

Mind Mapping: A graphic organizer for the pedagogical toolbox

Authors: Karen Goodnough and Robin Long

Title: Mind Mapping: A Graphic Organizer for the Pedagogical Toolbox

Publication: *Science Scope*, Vol. 25, No. 8, pp 20-24

Date/Year: May 2002

Purpose

This study explores ways that Mind Mapping can be used for the teaching and learning of middle school science. The idea was to supplement the limited research currently available on how to best use Mind Maps in the classroom. The Mind Mapping technique was chosen because of its potential to support many of the researcher's beliefs on how students learn best.

Description

The subjects of the study were 16 sixth grade students with mixed academic ability. Mind Mapping was used in a single unit of science midway through the year. The Mind Mapping technique was introduced to the students initially with a background lesson on using symbols and then with a lesson on the specific elements of Mind Mapping, which included creating a Mind Map while working in groups. Throughout the science unit, Mind Mapping assignments were used extensively for teaching and learning. Once students became more comfortable with the technique, teacher-directed use of the tool decreased and a variety of Mind Mapping activities were employed for enhancing student learning.

Key results

The researchers found Mind Mapping to be a useful method for:

- Introducing new concepts – The use of coloured markers helped to enhance memory as students made connections amongst ideas and it was an activity that students generally enjoyed. The creation of symbols was also motivating to many students.

- Providing a whole-class focus for a large research project – Using a large class-generated Mind Map as a focus for a unit of study was one of the most successful applications of Mind Mapping in this study. It proved to be an excellent method for fostering team collaboration.
- Assessing student learning – Mind Maps offer a non-traditional format of testing that allows teachers to determine whether poor written work is due to a misunderstanding of science concepts or under-developed writing skills.
- Offering choice in student assignments and projects – By the end of the unit, some students chose Mind Maps periodically when completing assignments, indicating that it was the format which best enabled them to show their understanding.

Conclusion

Mind Mapping offers an alternative means for students to share their knowledge and understanding. It caters to both the verbal-linguistic and visual-spatial intelligences through its combination of graphics, symbols and text. As such, it fosters expressive thinking in a way that is both fun and motivating for students.

Full paper available at:

http://www3.nsta.org/main/news/stories/journal_archive_date_list.php?category_ID=87&issue_ID=840

Mathematical Mind Mapping

Author: Virginia S. Entekin

Title: Mathematical Mind Mapping

Publication: *The Mathematics Teacher*, 85, 6, pg. 444

Date/Year: Sept 1992

Purpose

This article describes how a teacher used Mind Mapping as a pedagogical tool for mathematics classes.

Description

Mind Mapping was integrated into classes as a summative task for material previously presented. The teacher would lead the task by asking questions and the Mind Map would evolve as students' responses were added to it. As the map grew, students' interaction would increase and the teacher would become less involved.

Key results

The teacher reports that the process of Mind Mapping enables mathematical relationships to be quickly and accurately recorded. The form of a Mind Map gives clearer understanding for study and recall. Students can choose how to arrange their maps and can add details such as shapes allowing for originality, diversity and fun. Without any encouragement, many students went on to incorporate Mind Mapping into their notes. Mind Mapping was found to be applicable to a single mathematics topic or a

whole chapter and can be used to introduce new concepts which can be expanded in later lessons. This visual representation of a subject helps students relate unknown concepts to known concepts.

Conclusion

In a classroom environment, mathematical Mind Maps can be modified continually to achieve useful results. A Mind Map is a helpful method for remembering relationships and steps in an algorithm. It can assist students in conceptualizing their learning and helps them recall what is necessary to execute the mathematical process.

Mind Mapping and concept Mapping as tools in Mathematics education

Author: Astrid Brinkmann

Title: Graphical Knowledge Display – Mind Mapping and Concept Mapping as Efficient Tools in Mathematics Education

Publication: *Mathematics Education Review*, No. 16

Date/Year: April 2003

Purpose

This paper explores the suitability of Mind Maps and concept maps as pedagogical tools for mathematics education and discusses their possible applications within the field.

Description

Theory conveys mathematical knowledge as having the character of a network with mathematical concepts, definitions and rules all interrelating with each other and with aspects of the external world. The author examined the methods of Mind Mapping and concept mapping with respect to their ability to allow students to experience this network character of mathematics by visualising it. As part of the research, the author sought feedback from teachers who attended further education events where information on these tools was being presented.

Key results

The author brings attention to the similarities between the structure of Mind Maps and the structure of mathematics. Both are depicted in a tree-like structure and this emphasises the usefulness of mathematical issues as topics for Mind Maps. Several uses were identified for Mind Maps in mathematics education including: to organise information, as a memory aid, to foster creativity and show connections between mathematics and non-mathematical concepts. From a negative standpoint, it was pointed out that that a Mind Map may sometimes appear confusing. This is largely because Mind Maps are very individual graphic representations and different people have different associations with the same topic.

Concept maps were also found to be useful in a variety of situations such as to help train the brain, for revision of a topic, for the design of instructional materials and for identifying students' knowledge structures. A key limitation of a concept map is that it does not have an open structure which allows new ideas to be added easily in the way that a Mind Map does. It also does not allow the same display of creativity that can be achieved with a Mind Map.

Feedback from teachers was generally very positive in relation to both techniques. Many reported that both tools were especially beneficial for students who were not good in mathematics as it is through creating a map that they first see connections between mathematical concepts.

Conclusion

Both Mind Mapping and concept mapping may be effective tools to improve mathematics achievement. Teachers would need to decide which of the two methods they would want to use depending on the outcomes they want to achieve. The author believes that the various positive learning effects of using the techniques should result in their growing usage in mathematics education.

Full paper available at:

<http://www.amet.ac.uk/mereview/mer16pdfs/mereview-16-Apr-2003-4.pdf>

Online learning programmes using Mind Mapping

Author: Diana Thompson

Title: Online learning programmes using mind-mapping techniques at Ninewells Medical School

Publication: Training & Management Development Methods, Vol. 17, 5, pg. 525

Date/Year: 2003

Purpose

This article describes the use of interactive Mind Maps as a tool for business and education.

Description

Following calls to update the methods used in medical education, an internet-based online learning and revision service was introduced as a supportive tool to be used alongside traditional methods such as hands-on patient experience, lectures and revision classes. Created by Dr Ruta of 3MRT Ltd, this system combines the concept of Mind Maps with the power and accessibility of the Internet. Entire learned texts and commercial and technical know-how within organisations are produced in Mind Map form to provide a common source of learnable material. Although it was originally created for education, the system now also caters for business users. For example, online revision tools have been created for those being trained for Prince 2 project management qualifications and Management of Risk.

Key results

Interactive Mind Maps offer exciting possibilities for education and business users. Complex subjects are presented in a comprehensible way and the levels accessed on a Mind Map can be as shallow or deep as the user wants. Students can view lecture notes, PowerPoint maps and revision tools as well as undergo tests and assessments. The system is also interactive. For instance, it uses retrieval practice techniques where users are asked questions about a subject they have been studying and it will automatically

schedule Mind Map reviews to build long-term memory of the subject. Dr Ruta comments that computer Mind Mapping software takes the potential of Mind Maps even further by allowing users to create their own Mind Maps on-screen with lots of supporting facilities.

Conclusion

Mind Maps can be successfully used as an online interactive tool to offer continuous learning opportunities. They are particularly important for reinforcement and revision and as a means of keeping up to date with information.

Mind Mapping helps children remember lessons

Author: Miriam Haskell

Title: Mind-mapping helps children remember lessons

Publication: *The Fayetteville Observer*

Date/Year: 8th Oct 2005

Purpose

This article describes how teachers in Warrenwood Elementary School use Mind Mapping to help children recall information from a lesson.

Description

Many teachers at the school began using Mind Mapping in 2003. They saw the need for a new approach to teaching that would help them support the different ways in which children learn. With Mind Mapping, children who struggle to read or write can communicate using pictures and other visual aids instead. Children come up with picture clues that help them remember different facts, rather than memorising long notes.

Key results

Several benefits of using Mind Mapping are reported by the school.

- Children respond well to it because it is an enjoyable activity. They think they are drawing and playing, not taking notes.
- It helps children answer questions on end-of-grade tests. Those who can't easily recall a page of notes can remember a picture and its associations in the Mind Map to answer questions.
- It works across the curriculum, in any subject.
- It provides a personal approach to learning for the children.

Conclusion

Mind Mapping is an effective tool for helping children remember important lessons.

