

INTEGRATING STIMULUS-BASED CONCEPT/MIND MAPPING INTO INTERACTIVE BIOLOGY 'CHEAT SHEETS'

MEERA RADA KRISHNAN
Sunway College Johor Bahru

ABSTRACT

This approach of teaching centres on the construction of structured graphic displays of conceptual schemes within well circumscribed domains. It introduces students to the complete visualisation of any topic based on the key concepts acting as a stimulus. Every topic review begins with brainstorming to recognise and identify all key concepts, followed by a hierarchical organisation of related clusters of concepts. Each stimulus creatively initiates a chain reaction, consecutively linking to relevant subtopics which in turn are mind-mapped to all other detailed supporting data. It breaks down otherwise overwhelming amounts and depths of data into simple key concepts without compromising on subject coverage. This leads to the much needed flexibility for students to get familiarised with integrating their own ideas into effectively planning and organising a complete and compact 'cheat sheet'. Students develop the skill to retain and reproduce all relevant information on a topic sparked off by the stimulus. Furthermore, students enthusiastically look forward to the lessons due to this diverse and attention grabbing technique. This method effectively encourages students to be more proactive as well as guides students to quickly grasp the overview of any topic and focus on relating the relevant concepts to the key concepts for long term understanding. It is a skill that cultivates into a habitual attribute that is applicable at all academic levels.

Key words: Mind map, concept map, Tony Buzan, Nova Mind.

INTRODUCTION

Mind maps are diagrams used to represent words, ideas, tasks or other items, designed for the purpose of aiding in better thinking and remembering in order to creatively solve problems. Mind mapping encourages creativity and flexibility and focuses on a brainstorming approach to link items arranged around a central key word or idea. This approach enumerates and connects concepts whilst avoiding the tendency to begin within a particular conceptual framework.

Mind maps are tools used to generate, visualize, structure and classify ideas based on concepts learnt in class. At the same time, mind mapping also serves as an excellent means of recalling existing memories. It is an image-centred diagram that represents semantic or other connections between portions of information listed clearly and concisely. Ideas (facts) are presented in a radial, graphical, non-linear manner, making mind maps more realistic, as not all ideas organise themselves tidily into an outline format.

The order in which ideas are in is not emphasised at all, thus avoiding the paralyzing thought of where and how to begin. The key is to begin anywhere and at any point, as long as there is a trigger mechanism.

LITERATURE REVIEW

History

There have been known usage of image-centred radial graphic organization techniques for centuries by educators, engineers and others for the purpose of learning, brainstorming, memory, visual thinking and problem solving. The earliest examples of mind maps were those developed by Porphyry of Tyros, a noted Greek philosopher who graphically visualized the concept categories of Aristotle. His mind map, known as the Tree of Porphyry, was presented in the form of a hierarchical taxonomy.

In the late 1950s, the semantic network was developed as a theory to understand human learning. This was further developed into mind maps by Dr. Allan M. Collins and M. Ross Quillian during the early 1960's.

Modern mind mapping is thought to be introduced by Tony Buzan, a British popular psychology author and educational consultant. He claimed that his idea was inspired by Alfred Korzybski's general semantics as popularized in science fiction novels. Buzan received double honors in psychology, English, mathematics and the general sciences from the University of British Columbia in 1964. Buzan developed mind mapping out of the frustration of the long and tedious task of creating and reviewing traditional notes.

He promoted mnemonic systems and his mind mapping techniques in his book, *Use Your Head*. He also launched his own software program in December 2006 in support of mind mapping, called *iMindMap*. Many of his ideas have been set into his series of five books: *Use Your Memory*, *Master Your Memory*, *Use Your Head*, *The Speed Reading Book* and *The Mind Map Book*. Buzan has also written on subjects pertaining to the brain, genius quotient, spiritual intelligence and creativity.

Tony Buzan based his teachings and ideas on the general awareness of the extensive capabilities and capacities of the brain and its function, memory skills, reading skills, note taking and making, creativity and long term brain function improvement. He has worked with numerous entities, children and high profile individuals in guiding them on maximizing the use of their brain power.

Applications

Mind maps can be used in a number of ways in personal, family, educational and business situations. This technique covers note taking, brainstorming, summarising, revising and clarification of thoughts.

1. Use as an Educational Tool

Students can be introduced to this technique with suitable examples. They are then encouraged to take down notes using mind maps for the most important points. Students are also introduced to the ability of mind maps to act as a mnemonic technique to aid in sorting out complicated ideas by collaborating with creativity in note taking. During a lecture,

students can draw rough mind maps by hand and later integrate the notes into interactive mind maps with the help of the many software programs available.

2. Teaching Benefits

Students have various learning styles. As an educator, it is indeed a challenge to be able to tap into the comprehension capabilities of each student and modifying teaching styles to match learning styles. This issue is completely addressed and resolved using mind maps. Lesson presentation is in accordance to the lecturer's own teaching style, whereby each student is given the flexibility to create a mind map that is best suited to their learning style. Therefore, instead of being moulded to fit into a pre-determined notion of note taking, students are free to take notes in a natural setting, customised to suit their individual style and thereby ensuring easier remembrance.

Lecturers can integrate mind maps in designing essential tasks, yearly requirements, lesson plans, presentations and lecture outlines. Handouts produced using mind mapping are clearly organised and able to induce a more positive response from students due to the interactive nature of the mind map.

Due to the fact that mind maps incorporate a multitude of different cognitive learning aspects, they serve as an integral tool in creating and maintaining the interests of students with various learning capacities. Ideas can be combined in order to visualise the bigger picture.

3. Learning Effectiveness

The mind map is thought to be a significantly superior note taking tool as opposed to traditional note taking, primarily because it does not lead to a semi-hypnotic trance state induced by the other forms of note taking. Tony Buzan believes that the brain actually scans information in a non-linear fashion, as opposed to the left to right or top to bottom arrangement of conventional notes.

Students are able to quickly identify and understand the structure of a subject and how all the related pieces of information are linked together. Mind maps are more compact compared to conventional notes, enabling associations to be performed with ease and simplicity. Another very important feature of a mind map is that it provides allocation for the integration of additional information into the original mind map with hardly any disruption. Students are then able to quickly review the mind map and refresh the information in their minds with just a glance. This renders mind maps as effective mnemonic devices. By remembering the shape and structure of a mind map, students will be instantly provided with the vital cues needed to jolt their memory on the information within the mind map. In the process of assimilating and connecting all relevant facts in a creative manner, much more of the brain is engaged, thus allowing for better retention of facts.

METHODS IN CREATING A MIND MAP

Introducing the Idea of the Mind Map

Prior to the first lecture, students have to be eased gradually into the whole idea of mind maps. After years of being exposed to conventional note taking, the introduction of this technique will serve as a refreshing alternative that taps into the creative side of every student. Students are very easily distracted and bored by rows of notes that are almost robotic in nature. Once mind mapping is understood, students will find that they're able to create their own notes in a format optimised to ensure their comprehension and reproduction of the facts learnt. Every mind map is unique and specific, no longer making note taking the mundane task it used to be. When students review their mind map, they are able to instantly link the topics to the relevant subtopics.

One of the simplest ways of introducing a new concept is to compare the results before introduction and after. Appendix I shows the example of a questionnaire used to introduce mind mapping to students. Students are given the questionnaire twice, once prior to the introduction of mind mapping and once after. The time taken to complete it is set and students will be able to clearly see the significance of mind mapping in the enhancement of memory. This will definitely impress and convince students to incorporate mind mapping in their daily ventures.

Creating Mind Maps

A complete mind map may consist of main topic lines radiating in all directions from the centre, linking to branches of subtopics and relevant supporting facts. The structure of the mind map usually is ever evolving, and is best not to be confined to a particular shape or size.

1. Steps

The steps to be followed are as follows:

- Write the title of the subject in the centre of the page (landscape) with a circle around it.
- Draw lines out of the circle, connecting to major subheadings
- Draw lines from the subheadings to link to related facts and topics.
- Link new information to the mind map appropriately.

2. Hints and tips

Single words or very simple phrases are used for information, avoiding excessive filler words. Different ideas can be separated by different colours to ensuring better subject organisation and easier visualisation during recall. Students are encouraged to use symbols or pictures that mean something to them in order to remember information more effectively.

Cross linkages also assist in relating different parts of the mind map to each other, allowing students to truly grasp how one part of the topic affects another and the connection between two or more subtopics.

3. Software Tools

There are many software tools available to enhance the experience of creating mind maps. These high quality mind maps can then be easily edited and redrafted. Some examples of such software programs are the NovaMind Software and IHMC Cmap Tools.

CASE STUDY

Ed Borasky, of Borasky Research works with neurolinguistic programming and mind mapping. He claims that upon using mind mapping, his productivity has doubled. He starts his seminars without adhering to a strict outline, instead allowing the points to expand and evolve as he interacts with participants.

CONCLUSION

The role of an educator is not merely teaching students theories and facts. To enhance the learning experience of every student, an educator has to cater to many different learning styles and capacities. By teaching students a more efficient manner in which to take notes, this ensures better retention of lessons and inculcates the interest in each student to explore their creativity. Presentation of mind maps is not limited; each individual decides the best structure, colour and symbol used.

The use of mind mapping releases students from an otherwise mundane and eventless series of lessons and note taking. Students have to be stimulated to allow maximum absorption of lessons. Mind mapping does this by instantly connecting all the facts of a topic in a relatively easy and customised way to suit each student. Once students are able to visualise the representative symbol corresponding to a particular topic, the mind map kick starts a chain reaction in the minds of students, linking all relevant facts.

The implementation of mind mapping at any academic level will only enhance the learning capacities of each student. During just one lecture, different students with various learning styles can all reap the full benefit of the same lecture in their own individual learning style. This technique once learnt, can be utilised throughout an individual's academic life and modified to be used in working life as well. It is an invaluable skill that merely requires the right tools to trigger. After all, expression of one's creativity is inborn and very personal; the key is to instil the realisation in students that they do possess it. As an educator, it is imperative that all potentially beneficial teaching and learning techniques are explored and passed on to students in order to cultivate realisation that the learning process is an infinite continuum.

REFERENCES

http://en.wikipedia.org/wiki/Concept_map

http://en.wikipedia.org/wiki/Mind_map

<http://www.mind-mapping.org/mindmapping-and-you/basic-introduction-to-mindmapping.html>

<http://www.mind-mapping.org/mindmapping-learning-study-memory/Early-visual-maps.html>

<http://www.mind-mapping.org/mindmapping-learning-study-memory/rules-of-mindmapping.html>

<http://www.nova-mind.com>

<http://www.stateuniversity.com/blog/permalink/Using-Mind-Mapping-Strategies.html>

APPENDIX I

The following is an example of a questionnaire for students to understand the benefits of mind mapping.

MIND MAPPING

AIM : Discover how knowledge is constructed in your mind. This quiz will be performed twice, once before and once after students have been instructed on this topic.

METHODOLOGY:

- A list of given words related to the main topic is provided in each of the following pages. Write a word/words (contributed word) that immediately pops into your mind that is related to the given word. You are allowed to use diagrams if preferred.
- You should not spend more than 30 seconds on each word.
- Draw a link between each contributed word and the given word to state the relationship, if any.
- Repeat this on every page, one at a time without going backwards.
- On the last page, connect all the given words to the main topic and include the linked constructed words as best as your memory serves. You are to spend no less than 2 minutes on this last page.

REQUIRED DETAILS:

Name : _____

Date : _____

Test Session (circle the applicable option) : PRE-TEST / POST-TEST

Highest education level : _____

Current Pre-U Course pursued: _____

Wait for instructions to begin.

TOPICS COVERED: GENETICS

For each of the following words (normally provided in individual pages), write down other associated words or biological terms related to it. You may provide diagrams if preferred. Spend no more than 30 seconds on each word.

MEIOSIS

VARIATION

GENE

ALLELE

LOCUS

PHENOTYPE

GENOTYPE

DOMINANT

RECESSIVE

GENETIC CROSS

GENE MANIPULATION

INSULIN PRODUCTION

Using the words above, outline a detailed concept map in 2 minutes. You are allowed to provide representative diagrams. You must follow the sequence of words in a descending order as seen above.