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Significance of Colour Usage in Cognitive Mind Maps to Enhance Academic Achievement

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ABSTRACT

Colour is a significant aspect of Cognitive Mind Maps which are visual representations of a subject to enhance recall. Entire lessons form visual images with key words. Scientific studies indicate a basis for relating colour and its effects to memory and recall. Colour plays a pivotal role in successful encoding, storage and retrieval of information. Extensively used in the corporate world, research studies involving Mind Maps using colours, in U.K. and Australian schools claim successful results. There is little documented/published evidence of the same at high school levels in India. Sound educational systems but changed lifestyles have joint families-now nuclear, with high school 'latch key' children succumbing to dangerous distractions like TVs and computerized gadgets. School children not supervised closely may not perform to their intrinsic potential. Dependence on guides/question banks cause students to memorize answers without understanding lesson concepts. Research on Mind Maps with colour, as a teaching/self study aid, will find potential for application in NCERT/SCERT textbooks.

Keywords: *Colour, Mind Maps*

"**M**ind Maps" are visual representations of the essence of a subject or topic. (Buzan, 1996.) Cognitive processes include attention, perception, memory, understanding, reasoning, problem solving, knowledge and intuition. (Galotti, 2008). Cognitive maps assist in perception and 'layout' of key facts allowing the "mind's eye" to record images in order to enhance recall and learning of information. (Esgate, Groome, 2012)

Role of colour in Cognitive Mind Maps:

Color is the visual perceptual property in humans .Color derives from the spectrum of light interacting with the light receptors in the eye *Research emphasizes the relationship between colours, attention and memory performance.

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Colour and the Brain:

Scientific studies draw attention to the significance of colour in different areas and its effects on the human brain and memory. Experimental work on the role of colour in arousal of emotions, and its impact on memory and performance are reviewed.

Colour plays a key role in the visual impact on the brain. It is an important aspect of human perception influencing cognition.

Colour and information recall: Memory models

Human memory comprises short-term and longer-term memory Atkinson and Shiffrin. Visual stimuli first reach the sensory register where vast information can be retained there but only briefly and is then moved to the short-term store. It is transferred to the long-term store for permanent storage through various processes.

Craik and Lockhart's model states that the memory processes are more important than the structure of the memory system it suggests a continuous sensory process graduating to a deeper semantic memory process.

Colour as a Powerful stimulus: Colour and attention:

The role played by colour in engaging attention is indisputable. Colours attract attention. Farley and Grant.(1976). A study on cognition did comparative analyses of colour and non colour trials to gauge the advantages of coloured presentations and proved successful. Greene, Bell, and Boyer (1983) Warm colours like yellow, red and orange were found more effective than cool colours like brown and gray.

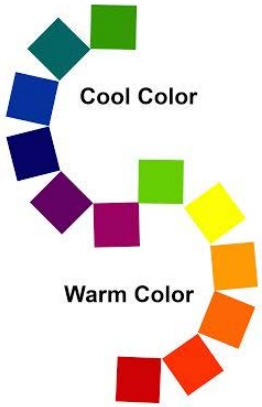


Fig.1

Interim memory processing involves recognition and labeling and logical analysis like the meaning of the information and its connection to the memory trace. It is assumed that deeper level of analyses contributes to more lasting and longer memory ability.

So it is important for the stimuli available in the environment to have the potential capacity to activate attention resulting in deeper level of processing for the information to be better remembered. Early studies show evidences that colour has that quality. Colour can profoundly affect the degree of attention and arouse emotions which later promote memory and recall.

Colour and memory:

Colour facilitates memory of select information by increased attention levels. Hence it plays an important role. With increased focus on some stimuli, chances of details being shifted to permanent memory storage are increased Sternberg (2009). Color enhances memory for graphs and charts, and increases recall. Branches in different colours promote right brain activity and creativity, visually differentiating parts of a subject promoting recall.

Coloured branches separating Themes:

In Pan's (2009) study on working memory and visual attention, participating groups were asked to differentiate between colours/shapes of two objects that were presented. In the first experiment, the colours of both objects were the same but shapes were different, in the second the conditions were reversed. The results indicated the groups' response times were speedier in identifying the differences in colours compared to differences of shapes in both experimental conditions (2012). This study suggests that colours have a higher ability to capture attention than other variables.

Complementary or triadic color scheme is used to highlight the difference between things. Analogous color scheme creates harmony. One color dominates and the other two support and highlight facts.

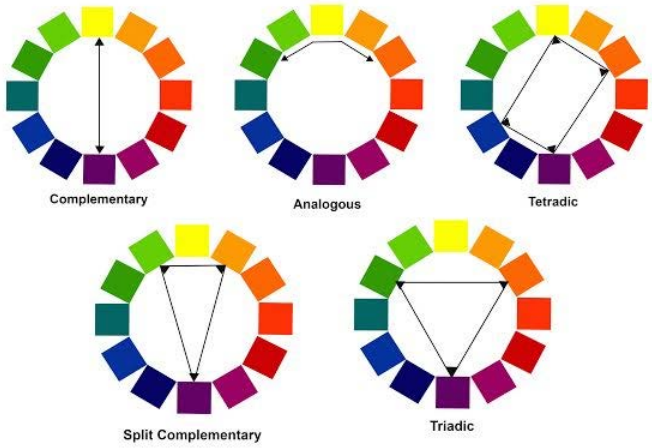
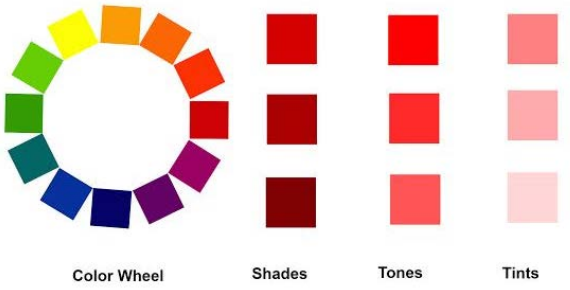


FIG.2

Monochromatic colour scheme to group similar factors and good for providing structure.

Monochromatic:



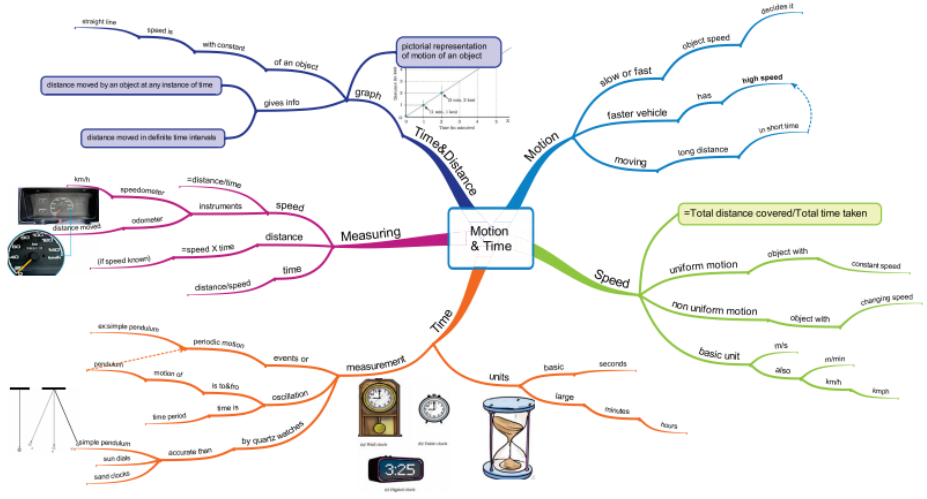
Monochromatic Scheme of Red

FIG.3

Pan (2012) further to his previous work experimented on verifying the colours. He used visible geometrical shapes with various colours. The participants were asked to memorize both colours and shapes of objects. In the memory test, the group was asked to identify the colours and shapes of objects presented earlier. He found the participants performing better in recognizing colours of objects rather than shapes. The results complemented his previous experiments where colour had a greater impact on attention than the shape. So in conclusion, colours promote higher levels of attention and recall. Color improves comprehension by 73 per cent.

Role of Colour in Arousal and Memory:

Arousal (emotional) plays a key role in keeping the information in the memory system. Colours promote the connection between arousal and memory. Kaya and Epps (2010) Colours enhance levels of attention and give rise to emotional arousal contributing to



Processes that will later increase recall. Farley (1976)

FIG.4

Mind Map on light background.

Wichmann, Sharpe, and Gegenfurtner (2002), found evidence of effects of colour in improving visual memory. Vernon and Lloyd-Jones Hall (2004) conducted studies to examine effects of colour in implicit and explicit memory performance. The participants were faster in recognizing objects in coloured rather than non-coloured conditions. Coloured elements with non-coloured background resulted in better memory performance and faster response times in comparison to coloured elements with coloured background.

These studies indicate that colour can have a positive influence on memory recollection. To summarize, memory performance is based on a few factors. The consistency of colours used in accordance with the encoding specifically that shows the close connection between , encoding, and retrieval in memory performance. The correct patterns of colours are important because they can produce stronger contrasts which can influence memory and recall.

Impact on Education:

Although mind maps are used by over 250 million people worldwide (Tony Buzan, 2006.) there is relatively less usage in schools by students and teachers. Though extensively employed in the corporate world there is little evidence of the same to enhance study skills in schools which have a large proportion of students from middle and lower socio-economic status. There is a disturbing tendency for increased dependence on guides to school textbooks and question banks. Students often try to memorize whole answers from published workbooks without understanding the concepts in lessons. If students can be guided and encouraged in the usage of coloured Mind Maps as a self study aid, it can be an interesting motivating approach to study and an effective self study aid to increase productivity.

Social Relevance:

Students facing coping difficulties in English medium schools, in whose homes spoken English is a rarity, may have greater conceptual understanding and recall of the subject matter. While some published textbooks in schools have what is called “Mind Maps” at the end of each lesson, they are more in the nature of “concept maps”. Concept maps are graphical tools for organizing and representing knowledge. Ausubel, D.P. (2000). Usually in black and white, they do not follow the guidelines for effective Mind Map usage like minimum 3 colors. (Buzan, 2005.) Elsewhere in the same textbooks there are numerous colorful pictures.

While the effectiveness of colour in Mind Maps is widely acknowledged and research and experiments have been done abroad, similar work in Indian high schools and subsequent findings tested and retested would allow incorporation of effective coloured Mind Maps in school text books especially in state and central board schools. This may promote a happy stress free study ambience in High schools.

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Conflict of Interests
The author declared no conflict of interests.

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