3. EDUCATIONAL ROLE OF MENTAL MAPS

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Abstract: *Thinking is the superior cognitive process of extracting the essential, logical and necessary features with the help of some abstract-formal operations for understanding, explaining and predicting some causal relations of reality and creating some concepts, notions, theories, cognitive systems as mental models of reality. Cognitive processing has a deep character, has a high degree of mental autonomy, a maximum level of selectivity in relation with the features of the world and life. Categorization represents the process of grouping on classes of the information avalanche we enter into contact every day. This information is grouped on classes, categories after certain criteria. Thinking mapping are used in learning activites and helps to form very different representations and then scientific concepts, to classify and compare this concepts, in describing the attributes of various notions and development of various reasoning such as spatial reasoning or cause-effect reasoning. The purpose of this study is to identify, categorize and highlight the role of thinking maps in the formation of cognitive skills in school activity. From the methodological standpoint, in the present study I used a more analytical approach to obtain a definition and classification of mental maps and identify advantages and disadvantages of their use. Conclusions and Recommendations: a good Thinking Map can be effective mnemonics - remembering the shape and structure of a Thinking Map can give it the cues you need to remember the information within it. As such, they engage much more of our brain in the process of assimilating and connecting information than conventional notes do.*
Key words*: thinking map, cognitive system, learning, cognitive skills*

1.Introduction

In modeling the reality, we rely on the knowledge we have, no matter whether it is real or imaginary, naïve or sophisticated; our mental models are mostly made up of "fragmentary information based on a partial understanding of what is happening and a naïve psychology postulating causes, mechanisms and relationships where, in fact, there is none of them (Norman, 1988, p.38).

The mental model is made up in order to understand an aspect of the outside world. In the process of mental modeling, the individual necessarily should use the previously gained knowledge and depends on the rate he sets an appropriate relationship between the previous knowledge and the new information delivered by the outside reality. When the individual works out a certain mental schedule, he may find out that this is inadequate to his aims. Now it is the moment when a new mental model start to be worked out in order to understand what is happening outside. "While the schedules are structures of precompiled generic knowledge, the mental models are structures of specific knowledge that are made up in order to represent a new situation using this generic knowledge… " (Brewer, 1987, pp.189, quoted by Katzeff, 1990). Thus, the schedule role is to deliver the individual pre-requested knowledge aiming to understand the interaction process as well as the knowledge allowing him to understand the indications delivered from outside, at the same time, in which way his schedule

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differs from an adequate model of reality. The quantity of information preserved in memory is a performance indicator and is based on the hypothesis that, theoretically, the information integrated into a coherent, unique, mental model can be easily reminded.

The mental model, especially the Thinking Map, is made up in order to understand an aspect of the reality. A good Thinking Map shows the "shape" of the subject, the relative importance of individual points, and the way in which facts relate to one another. This means that they're very quick to review, as you can often refresh information in your mind just by glancing at one. In this way, they can be effective mnemonics - remembering the shape and structure of a Thinking Map can give you the cues you need to remember the information within it. As such, they engage much more of your brain in the process of assimilating and connecting information than conventional notes do. Thinking Maps are useful for: brainstorming - individually, and as a group, summarizing information, and note taking, consolidating information from different research sources, thinking through complex problems, presenting information in a format that shows the overall structure of subject, studying and memorizing information.

2. Cognitive Skills

Cognitive skills are any mental skills that are used in the process of acquiring knowledge; these skills include reasoning, perception, and intuition. Mid-continent Research for Education and Learning (1998) describes the importance of cognitive skills in acquiring literacy skills: "Reading and writing rely on a specific set of cognitive skills such as attention, memory, symbolic thinking, and self-regulation. As children learn to read and write, they continue to improve these skills, making them more purposeful and deliberate. Deliberate attention is required to differentiate between letters, even if they look alike, and to isolate specific portions of a word for encoding or decoding it. Children must remember the previous words as they decode the subsequent words in a sentence. If they do not make a purposeful attempt to remember, they cannot extract what the sentence means. Writing and reading are the use of symbols and if children cannot think symbolically, they cannot learn to manipulate letters and words. Finally, self-regulation must be in place so that children can monitor their own understanding of the print so they can abandon ineffective reading strategies and move on to more effective ones."

Cognitive skills are what separate the good learners from the so-so learners. Here's why:

1. Without developed cognitive skills, children fall behind because they aren't able to integrate new information as they are taught it.
2. The sad truth is that most students move on to the next grade before they have mastered the basic academic skills like reading, writing and math… because they haven't developed cognitive skills.
3. Mental schemes used cognitive agent in the operation faster and with less effort in all the main processes of acquiring and processing of information:

perception, attention, memory, interpretation and evaluation. Here is a systematization of the problems of functioning schemes:

4. It is clear that we do not perceive and do not pay equal attention to all elements in the environment. There is a selection of stimuli, they are numerous and complex, whether direct or indirect, in particular through the media. Prior existence of schemes in our minds, guiding attention in particular on the elements "out" of the scheme, which does not confirm it.
But it was found that consonant information with mental schema information consonant imprint themselves better and faster in memory and more easily find them in the memory.

5. Mental schemes increase the speed of information processing, but there are situations in which the evocation of schemes that include many elements that are not perfectly consonant, slow formation of an opinion or taking a decision.Schemes have also function that, action by an automatic inference, complete the picture information. In confronting reality with schemes, almost always appears in the foreground comparison of "what I expected" and "what we found". The extent to which the two plans are identical, it is a strong source of satisfaction or dissatisfaction.

6. The confrontation between our mental structures and concrete reality data, not automatically lead to disagrements. Most times the two plans harmonize because:

a) we choose the cases to confirm our schemes;
b) because we perceive, judge, and reason (justified) structures;
c) sometimes we change radically our patterns;
d) schemes are required to the reality, transforming it in accordance with our wishes, expectations. If you expect something and do you think that it will be complete, it becomes real – phenomenon called "self-fulfilling prophecy" (R. Merton, 1957, 57-67). Robert Merton interpreted inter-ethnic relations in the USA: whites perceive black men as uneducated, lazy, forgetting that they are so because of stereotypes or practices of whites (expectations).

Whether innate or acquired support are our mental schemes, they help us cope with a continuous stream of stimuli, to order the received information, and thus we can communicate and act effectively. In the literature, the concept with the highest degree of generality and best use is that of "mental schema". He subordinate the notion of "category", "prototype", "stereotype".

Schemes refer to itself, to other people, the roles and social institutions, the social groups and nations, to social events. They are the function to simplify and make faster filtering and organizing information, storing it in memory and recall, therefore to make decisions and act as promptly and efficiently. An important aspect of these schemes is that many of them have a hierarchical organization,in the top of the hierarchy hovering the abstract and general elements, which, as we descend toward the base, is specifically distinct categories, gains concreteness, to specific cases. The association between the components of the schemes, often, rather as a "tangled" ball, striking interference than a clear hierarchy. Some authors (Doise et al., 1996, 64-65,

Corneille and Leyens, 1997, 50-56) considers that in social judgments, the most explanatory concept is that of “category” (and categorizing), or that he is first in the explanation of cognition, that of the "scheme". Simply say, the category is a class of objects that have common traits and high degree of similarity.

Human information processing system can be considered as consisting of three warehouses retrieval, five fundamental cognitive processes and two channels of knowledge representation. The three deposits are sensory memory retrieval, where sensory input is stored in its original form shortly, working memory, where a limited number of elements of the material presented in consciousness are stored and handled Vigil [engl. conscious awareness], and long-term memory, where large amounts of knowledge are stored for long periods of time. The five cognitive processes are selecting images, selecting words, organizing images, words and integration organization. The two channels are channel auditory verbal material enters the cognitive system through the auditory analyzer is finally represented in the code word and the visual channel / pictographic the material enters the cognitive system through visual analyzer and the latter is represented the pictographic code. Final cognitive process - Connect the pictographic-integration of visual working memory, verbal model of verbal working memory and prior knowledge of long-term memory. The result is an integrated representation based on visual and verbal representations of the material presented and on relevant prior knowledge. Overall, construction of knowledge requires that images and sounds subject to select relevant material presented, to organize them into coherent verbal and pictorial representations, and integrate verbal and pictorial representations of each other and with prior knowledge.

3.Thinking Maps

Dr**.** D. Hyerle grouped under Thinking Maps syntagm a set of eight metacognitive visual tools rooted in the eight cognitive skills: defining in context, describing attributes, comparing and contrasting, classification, part-whole spatial reasoning, sequencing, cause and effect reasoning, and reasoning by analogy. He used the tools to create a easy to use language for learning and information representation, the eight graphic primitives can be used in an infinite of ways. There are several diagrams which summarize what the eight Maps are about:

3.1. Circle type map

Circle type map which is used in description, brainstorming, defining ideas, things, concepts, objects. In the center of the circle we use a name, an idea, a concept, a symbol we want to define, to describe. Circle Maps are a perfect tool to introduce concepts, especially in primary school.

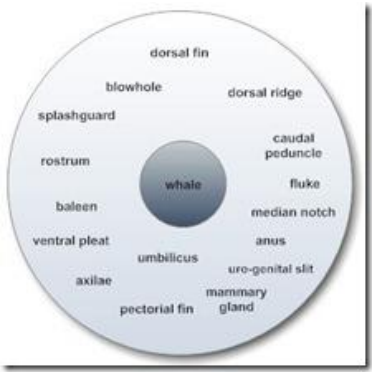

Fig. 1. Circle type map Source: www.mindtools.com.

3.2. Bubble map

Bubble map- represents the second type of logical diagrams of mental representations and are used for describing, characterizing the qualities of objects, things, ideas, concepts etc. In the central circle the object to describe is located, and around it, its features are connected with other connected circles. Extensively, a Bubble Map could be used for the same representations as Circle Maps, allowing thus explicit associations between a concept and its attributes, same it can include other part of speech, concepts or fragments of text.

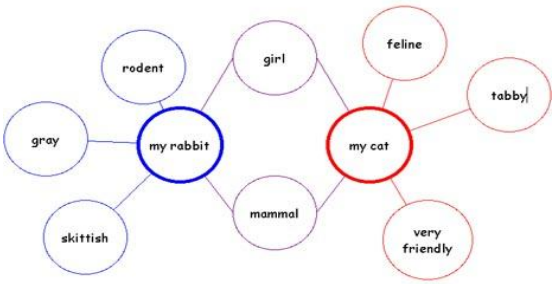

Fig. 2. Bubble map .Source: www.mindtools.com.

3.3. Double Bubble Maps

Double Bubble Maps are used for comparing and contrasting the descriptors of two concepts. Another popular tools used for the same purpose are the Venn diagrams, which mixes some of the characteristics of Circle Maps and Double Bubble Maps, though they are sometimes more complex to use and, in plus, they allow the comparison of multiple concepts.

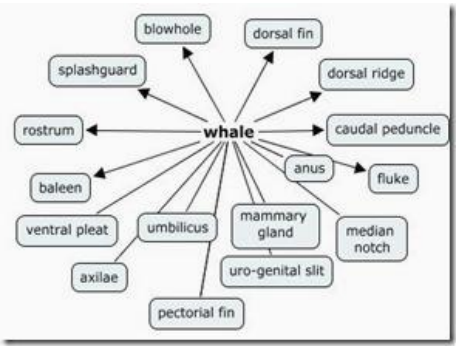

Fig. 3. Double Bubble map. Source: www.mindtools.com.

3. 4. Flow Map

Flow map this type of logical diagrams divides and ordinates a process in stages and phases. It is the type of mental representation of concepts, ideas characterizing as correctly as possible the concepts, ideas and processes described in the book of professor Golu since they are specific to cybernetic sciences structured on stages, phases. Hyerle's Flow Map seems to be slightly different than the flow diagrams used to model processes, and even if both maps are based on sequencing and ordering principle, the later seems to be more complex and use more representational elements, containing symbols for decision, delays, predefined subprocesses or data input/output. Hyerle's Flow Map resumes only at presenting information in sequencing and ordering manner, being capable of represent for example a linear causality sequence or the points on a scale.

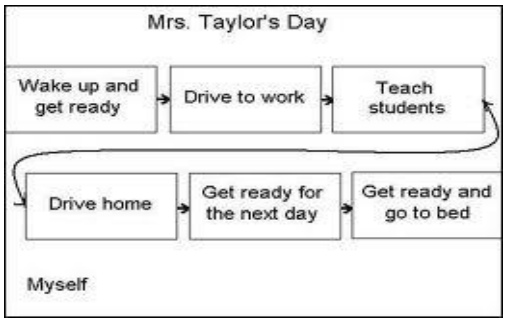

Fig. 4. Flow Map. Source: www.mindtools.com.

3.5. A Multi-Flow Map

A Multi-Flow Map is obtained by combining more than one Flow Maps, creating parallel or intersected sequences. Therefore they are useful to represent causes and effects diagrams, more like the well-known Fishbone diagram, the distinction residing in the fact that the multi-flow Maps not necessarily follow a hierarchical structure, multiple effects being possible.

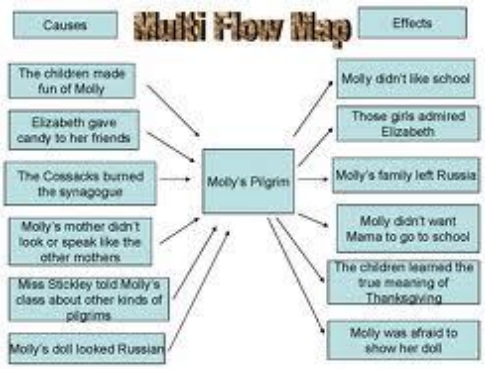

Fig. 5. Multi-Flow Map. Source: www.mindtools.com.

3. 6. Brace Maps

Brace Maps are the only type of Maps I often saw used in manuals or other type of books, usually for detailing the parts of concepts allowing thus to analyze the parts of a concept and the concept itself.

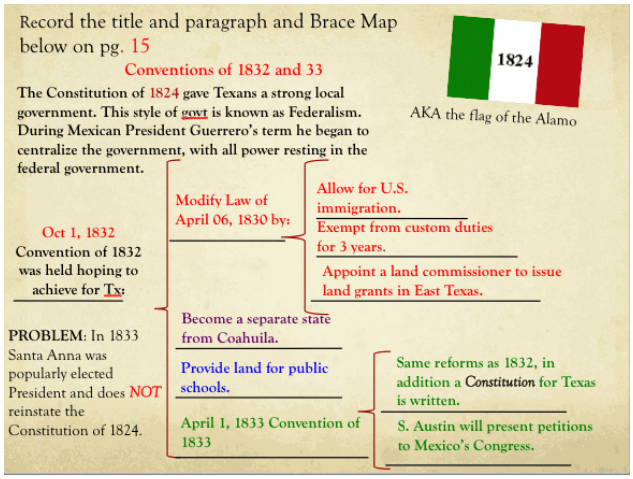

Fig. 6. Brace Maps . Source: www.mindtools.com.

3.7. Tree Maps

Tree type maps these are used for classification and grouping. Ideas and objects are sorted in categories and groups and sometimes new categories and groups are created. On the top of the tree, there are written the name of the appurtenance classes, categories, general ideas. Under each category, there are written the group members. These types of logical diagrams are ideal for studying tests, social surveys etc.

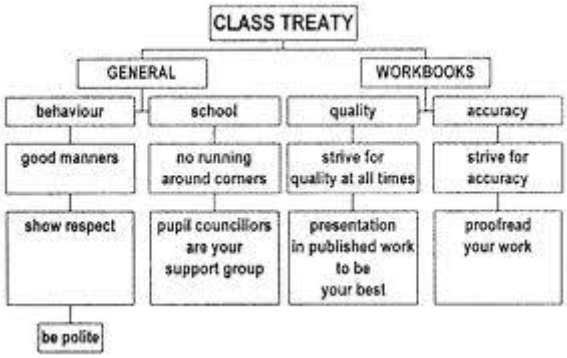

Fig.7. Tree Maps. Source: www.mindtools.com.

3.8. Bridge Maps

Bridge Maps can be used not only for simple analogies, but also for metaphors. I expect that in case are needed to be compared multiple related factor types for the same concepts, then it will be created one Bridge Map for each factor type. For such scenarios a simple table could be a better choice, in which the compared concepts form the headers, while the related factors are the actual records. Even more, the concept representing the concept type can be added too, forming a matrix.

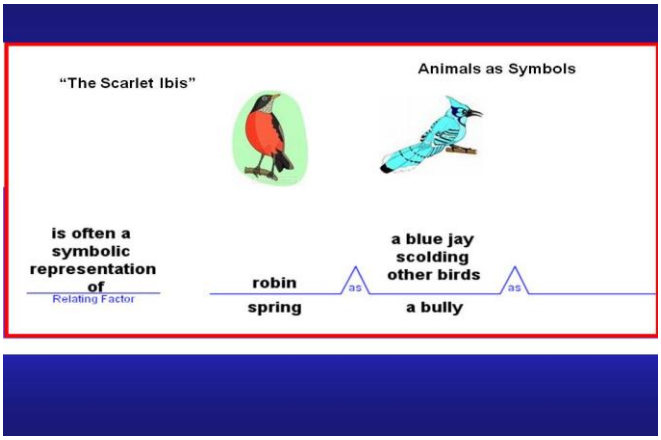

Fig.8. Bridge Maps. Source: www.mindtools.com.

4. Acknowledgements

Mind Mapping is a useful technique that helps you learn more effectively, improves the way that you record information, and supports and enhances creative problem solving. A mind map is a graphical way to represent ideas and concepts. It is a visual thinking tool that helps structuring information, helping you to better analyze, comprehend, synthesize, recall and generate new ideas.
In a mind map, as opposed to traditional note taking or a linear text, information is structured in a way that resembles much more closely how your brain actually works. Since it is an activity that is both analytical and artistic, it engages your brain in a much, much richer way, helping in all its cognitive functions.

It is hard to make justice to the number of uses mind maps can have – the truth is that they can help clarify our thinking in pretty much anything, in many different contexts: personal, family, educational or business. Planning the day or planning our life, summarizing a book, launching a project, planning and creating presentations, writing blog posts -well, you get the idea – anything, really. Mind maps are like conceptual models. Before one actually constructs and arrives at the formulation of a design, it is vital and mandatory to make a thorough scrutiny of every detail that contributes to the final design. Sometimes, we arrive at a complex solution but with simple steps to follow. But, many times one encounters several complexities in order to arrive at a simple solution. In such cases, mind mapping provides clarity and adds definition to every detail. It makes sure that the minutest detail is not overlooked. Mind mapping can be put to use effectively Education (studying and memorizing)

- Group mind mapping
- Workshops
- Note taking
- Creativity
- Creative problem-solving

Mind maps are usually drawn to suit an individual's brain as to its functioning and thought process. However, mind mapping is an excellent vehicle for effective training purposes and team working. There are quite a few

different ways in which mind maps can be used by groups. A simplistic method or means of using mind maps is called Brain Blooming. Brain blooming is an alternative to the process of Brainstorming. It involves capturing of individual thoughts and then blending them with thoughts of others within a group. All individual ideas and notions are given equal value. Mind mapping for effective training is improvised further by involving the discussion of Basic Ordering Ideas or BOIs of every individual. Thus mind mapping, through the process of Brain Blooming, enjoys a lot of important advantages over the process of brainstorming. It is an absolutely fascinating and rich way of achieving clarity as every little step helps engage an individual's brain.

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