Designing for Children
- With focus on 'Play + Learn'

Creative Learning – Mental Mapping for Deeper Understanding

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Abstract: Early inculcation of creative and innovative means to problem-solving can enhance development of the right-brain, enabling the child to hone his intellectual faculties to weigh all possibilities before arriving at the most appropriate solution(s). Besides the individual genetic makeup, the extrinsic factors and environments contribute greatly towards development of innovative coping styles to a given situation. More the encouragement towards utilization of divergent means of thinking, better would be a child's ability to grasp the subject and to construct his own learning and knowledge patterns which help him to express himself more lucidly and innovatively when it comes to presenting his own point of view on a given topic. The importance of taking into account what the child brings to the interactive educational experience has often been conveniently overlooked in the literature. These concepts find relevance in the research being undertaken on experience of Indian tweens on educational websites.

Key words: Creative Learning, Mental Mapping, Cognitive Learning, Visual Thinking, Creative Problem-Solving, Right-Brain Stimulation

1. Introduction

Every child has a unique way of seeing the world. Past experiences influence the perception and hence the reasoning abilities of every child differently. This depends on the mental makeup of the child. Extrinsic factors and the environments of the child also contribute greatly towards development of innovative coping styles to a given situation. Similarly, each child has different mental capacity to capture and process the information, and demonstrate the knowledge thus acquired. A child develops best in the environments which provide him freedom to explore and express himself without any inhibitions. Brain development of children living and learning in such environments is much better than those living and growing up in restricted, rule-based, rote learning environments.

More the encouragement towards utilization of divergent means of thinking, the better would be a child's ability to grasp the subject by creating mental models of the learning material supplied to him. Children who are introduced to linguistic game-plays and experimentation with shapes, colors, or material (e.g. playing with sand or artistic clay to create different objects and shapes, or articulating their figments of imagination) at a young age, may be able to construct their own knowledge patterns which help them to express themselves more lucidly and innovatively when it comes to presenting their own point-of-view on a given topic. Being young, their approach is usually more original, exploratory and innovative as they are not trapped within the bounds of conventional approaches. Such creative learning practices once embedded in the young mind come handy in all aspects of life.

Based on the above premises and the fact that the importance of taking into account what the child brings to the interactive educational experience has often been conveniently overlooked in the literature, this paper is being authored. The paper brings forth some of the experiences of Indian tweens, i.e., children in the age group of eight to twelve years, while interacting with the interfaces of educational websites being designed for them.

2. Laying the foundation of Creative Thinking

The brain is divided into two hemispheres, the left and the right. The left hemisphere, which essentially controls functions like the learning of words, numbers, lists, analysis, etc., is more logical. The right hemisphere helps in the perception of rhythm, imagination, colors, etc., and hence is more emotional. Most people have either of the two sides more developed. Successful people often evolve a learning strategy that draws from and effectively combines both. They use the total brain – the logical as well as the imaginative faculty (Mishra and Muralikrishna, 2004). If the infants are systematically taught to make effective use of both the sides of the brain, their development would be much better. In fact, based on the discussions held on a variety of topics with children studying in various school boards, it appears that the curriculum for primary school children in the International Baccalaureate seems to address this aspect of development in a much better way. Their emphasis on recreational and educational activities leading to overall development of the child leaves little room for rote learning.

Children who have learnt to stimulate their right-brain find it easier to convert a complex topic into a simplified, compact write-up or, better still, represent it in a diagrammatic

form, thus evoking and exhibiting deeper understanding of the subject. Enhanced learning through visual representation is most often chronicled in the disciplines of science and geography. Teaching and learning historical events or a language also becomes easier when presented visually. Young children are not always very good at expressing their ideas in words as their linguistic faculty is not well-developed at that age. In order to convey their message lucidly, they articulate their ideas by converting their knowledge of the world in to a visual form. In fact, imagery has a historical association with rhetoric. Since Greek and Roman times, visual thinking was linked to rhetoric through memory training and drill. Some visualizers combine objects to be located into a composite picture. Memory of children with good imagination is like a vivid multisensory collage. These sensory qualities endow memory with richness and vibrancy. There is a growing agreement in the scientific and institutional sphere that learning material which involves more number of faculties or sense-organs finds more acceptance among the learners.

Under appropriate conditions, even the so-called non-imagers can produce visual and auditory images (Marks, 1972). A sizeable literature has grown around the educational use of images. Mishra and Muralikrishna (2004) point out that children categorized as having low IQ learn better with images as this reduces the brain's resistance to learning and creates a pattern for the brain to rely on. Perlmutter and Myers (1975) found that 4 year olds were better able to recognize objects that they had seen before than objects that had merely been mentioned by name. Difficult words are also better learnt if they can be broken down and each part is associated with an image. The fact that finally emerges is that imagination, pictures, colors, rhythm and images are as important learning tools as words and numbers are. William James, the pioneer of American Psychology, remarked that bare concepts do just as well as colored images in running the ordinary affairs of life, but they are much less adequate for recalling a great symphony or the voice of one's mother or for appreciating a great painting, play, or novel (James, 1948).

Besides the intrinsic aspects, the extrinsic factors that aid the formation of innovative learning patterns are the environments that a child encounters during his/her phase of development. Exposure to multiple socio-cultural environments leads to widening of horizons, leading to exponential increase in knowledge of a child. As this practical knowledge translates into deeper understanding of the subject matter, the mind mapping for that topic increases manifolds with intricate linkages to various aspects of the topic.

To illustrate, during one of the warming up sessions before the actual investigation, this author asked four ten-year-olds about the forms in which fish could be eaten. Amongst these children, one was from Punjab and one from Delhi (North of India), one belonged to West Bengal (East), and one belonged to Gujarat (West of India). Their answers had some similarities like fish curry and fish fry; the differences appeared to be more regional, like the ones from the North of India mentioned savoring fish pakoras with grated radish and mint chutney in harsh winters. The child from West Bengal had traveled a lot within India and had lived in two different countries before settling back in India. Besides many other varieties in which fish could be eaten, he mentioned that fish could be eaten dry, like potato chips, sprinkled in a sandwich with mayonnaise. A simple topic, but significantly different responses based on knowledge about different cultures.

Undoubtedly this knowledge transcends and translates to an intricate mental mapping on the topic 'forms in which fish can be eaten':

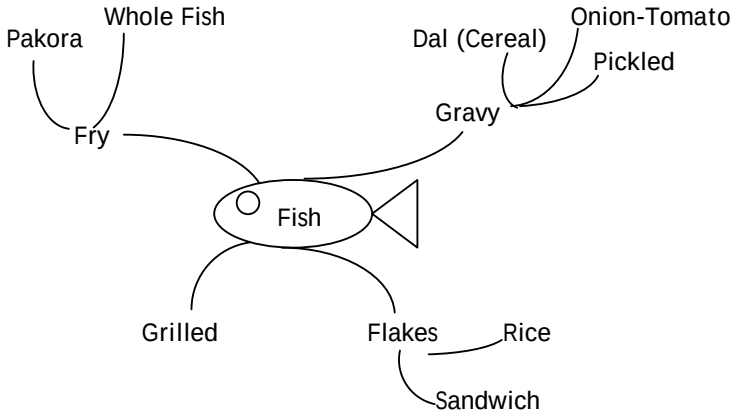

Figure.1 Mental Mapping on Forms in which Fish can be eaten

Mind Mapping as a method was primarily developed by Tony Buzan. He explains it thus: "Mind Mapping means for the information and space age what linear notes meant for the industrial age… It is a powerful graphical technology, a universal key for activating the potential of our brain. Mind maps can be used for a lot of purposes: planning, learning, analyzing, presentation and so on." (Buzan, 1993)

Mind mapping is an extremely powerful technique that can synthesize the various capacities of the brain and powerfully harmonize it to form a coherent whole (Mishra and Muralikrishna, 2004). The spray of associations can radiate from various centres, and each goes on to become a centre for another spray of associations. Hierarchical decomposition

of the subject matter into subtopics is possible with the spray of associations evaluating all aspects in context. These correlated associations can help the brain explore, question, structure, organize, and retain the information better. Creative imagination is based on correlations. Correlating one thought to or with another is the basic beginning of all new ideas. One can correlate even the most unlikely things with each other using just a bit of imagination. In fact, every situation has the potential to be creatively improved; the difference lies in the direction we nurture it in.

Difference in the method of approaching a solution on a given matter is the characteristic feature of children's thinking. Children have the most vivid imaginations. As they are freer to try out new ideas, they can actually carry their thought process beyond the 'practicalities' and restrictions imposed by an adult's mind to give a useful and workable solution. A child's knowledge and experience are limited and so the problem solutions are often impractical. But what matters is the way the child's mind uses the limited material at its disposal. It is this fluency that gives children an edge over adults in lateral thinking.

3. Creativity in the virtual learning environments

With the current enthusiasm for multimedia in schools, attention to production values has overwhelmed attention to content and its beneficiaries. Growing ease in access to and availability of high bandwidth for accessing the Internet has led to a surge of newer kinds of educational applications in the market place, represented as supporting a constructivist approach to learning, but in reality offering little educational value.

This paper builds on the research being undertaken on experiences of Indian tweens while browsing through the educational websites. A group of children was shown prototypes of e-learning websites conceptualized for tweens as a part of their curriculum by some students pursuing their post-graduation in Software and User Interface Design. Only a couple of sections of these prototypes were functional due to limited time period in which these projects were executed. Children's views were solicited on the interface design, colors, interest value, content, and interaction of each of the prototypes.

It may be noted that children were fascinated by those e-learning websites which gave them freedom to interact with the interface, make changes in color and font size, had an element of fun and energy, gave additional tidbits on the topic, allowed them to play informative games and learn at their own pace, had activities that could be done offline as well, gave them opportunity to voice their views on the topic and solicit feedback, and most importantly, had empathic pedagogical agents to guide their learning.

Views of children on some of the prototypes were as follows:

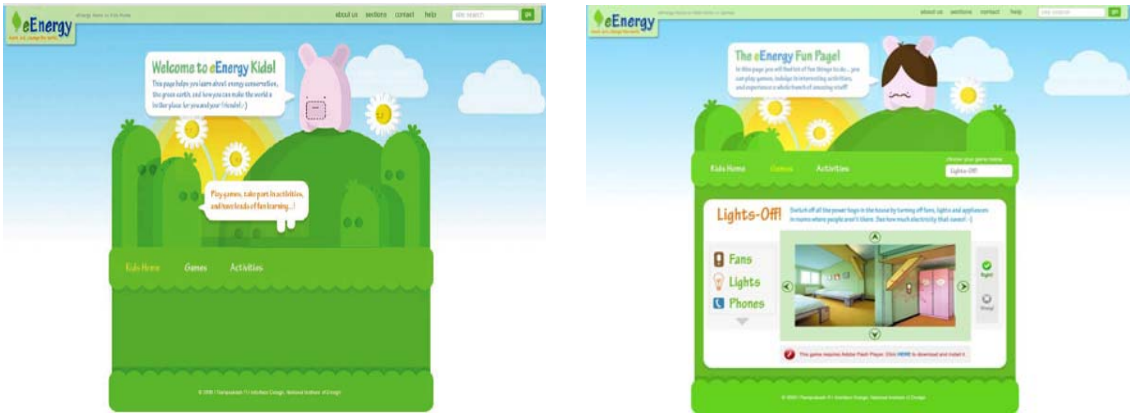

Figure.2 Prototype of eEnergy Website

eEnergy Website project (Figure.2) had a beautiful byline – Learn, Act, Change the World. The aim of this project was to create awareness among the children about environment preservation by using renewable sources of energy and by following practices in everyday life that were environment friendly. The prototype offered educational games on conservation of electricity, vermicompost pit, and so on. The visual appeal and the vibrancy of the interface, the change in looks of the pedagogical agent, the interactive blurbs of information, and the pleasing color combination immediately caught the attention of the children, and the animated look on their faces stayed for quite some time while browsing through the different sections of the website. The children were quite appreciative of the fact that the website contained a lot of visual information, which was of self-explanatory nature, relieving them of the arduous task of going through content, as was required from most of educational websites that they had browsed.

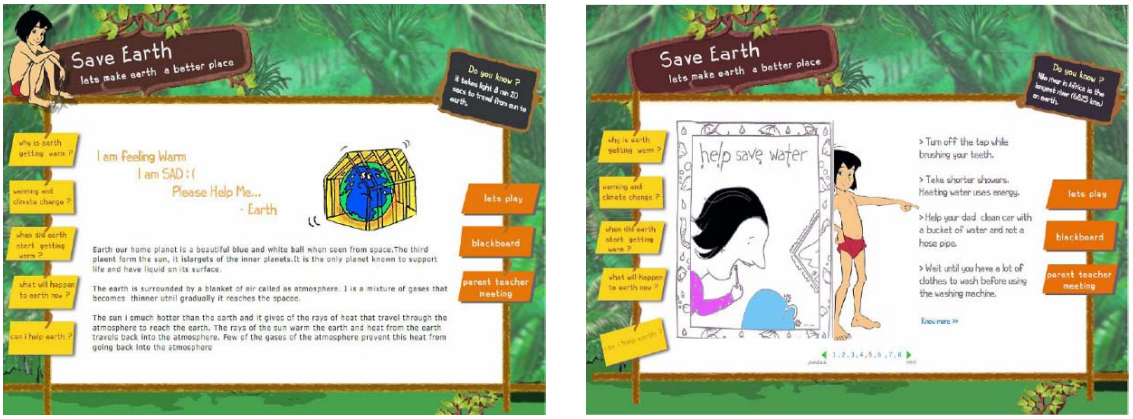

Figure.3 Prototype of Save Earth Website

To teach the impact of global warming on earth and its environment, Save Earth project (Figure.3) taught the concept in an easy-to-understand language and interface. The student designer made use of Mowgli as a pedagogical agent, who stayed with the child throughout the website and explained the concept of global warming and the importance of green pastures and the jungles to save the earth. Children appreciated the jungle theme and the simple language used in the navigational placards, but were skeptical to browse many pages as the website appeared to be content-heavy to them. They found the similarity in layout a bit boring. However, they enjoyed the section on activities, in which children could print posters and color them. From the posters they could easily relate to similar mistakes they were doing in their daily lives which were harmful for the earth and its environment. Apart from this section, they found little appeal in the other sections of the website.

Figure.4 Prototype of Easy Measure Website

Easy Measure (Figure.4) covered general information of the metric system and some basic conversion exercises to make Mathematics enjoyable for children. The website also offered games on measurement, interactive quizzes and exercises to test the knowledge and progress of the learners. The easy-to-interact interface, attractive color scheme, and interesting pedagogical agents, were appreciated by the children. However, apart from their favorite cartoon characters, Tom and Jerry, who did crazy things to enliven the web page, children found that the website could not entice them enough and offered nothing in terms of creativity in learning.

An important aspect that was covered in the activities' section of two of the prototypes mentioned above (eEnergy and Save Earth) was that they left much for the child to imbibe and experiment with. These designs were grounded in the constructionist theory, which postulates that learning takes places best by building things than by investigating things that are already built (Papert, 1993). An effort was made to incorporate the energy and fresh perspective, an inherent quality of a child, to the interfaces and interactions of the prototypes, such that the natural interactions seamlessly meld with the digital interactions to create a wholesome educational experience. Activities were associated with each topic, giving children the freedom to explore the interface for appropriate solutions. Much care was taken in ensuring that the goals of the educational games were not overshadowed by their functional aspects. Flexibility in the style and pace of learning addressed the needs of different types of learners. Experts opine that a pedagogical product which attends to the varying needs of learners, keeping in mind the importance of cognitive elements (Damasio, 1994; Goleman, 1995), is necessary for optimum learning to take place.

Important aspects to be taken into account in design of interactive pedagogical solutions, thus, must include: influences on learning, language of content, depth of learning (Bereiter, 2006; Brown and Campione, 1996), construction of knowledge, collaborative inquiry (Suthers, Toth and Weiner, 1997), e-experimentation, interactive discussion platforms, trainer intervention, and evaluation of knowledge thus gained. Besides, to keep the child engaged and to remove a sense of loneliness in the virtual environment, an empathic pedagogical agent could be designed, which offers affirmation followed by cognitive support based on knowledge exhibited by the child.

Virtual learning environment can be liberating but needs careful design and evaluation such that it supports a variety of natural human interactions and offers a creative learning environment to the children for effectively translating information into knowledge.

Conclusion

Creative imagination is of cardinal importance to the construction of knowledge and gaining of insights into the subject matter from multiple perspectives. The design of educational technology ought to facilitate creative thinking and thus ought to be seen as a part of instructional design rather than only as a source of tools for use in instruction. Designers ought to be aware of the human learning capacities and learner needs that must be addressed holistically for effective learning to take place. This would contribute to

creating a learning environment in which children are effectively able to create mental models of the learning material supplied to them.

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