DIGITAL MIND MAPPING AS A SELF-REGULATED LEARNING IN 21st CENTURY ELEMENTARY EDUCATION

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Abstract: This article presents an approach to foster self-regulated learning through digital Mind Mapping as a strategy learning and a technological means in Elementary Education. Having the ability to self-regulate will be an essential skill for life in the 21st century. Self-regulated learning aids the development of metacognitive (thinking about thingking) skills, strategic action (planning, monitoring, and evaluating personal progress against a standard), and motivation to learn but is regarded a cognitively demanding process, which should be supported by appropriate strategy and appropriate tools. By reviewing literature in teacher education through searches of journal database, we outline that through mind mapping is considered a promising approach in this context, especially aiding the organisation of knowledge; it is a tool contributing to the memorising of knowledge, repeats, summarises, recall information, correlates between information, and increases the student's awareness of these cognitive structures. Additionally, Learning process that enhanced by digital mind maps and encourage creative thinking become faster and easy in generating and organizing ideas, and improve efficiency in note-taking in 21st Century learning.

Keywords: Digital Mind Mapping, Self-Regulated Learning, 21st Century Elementary Education.

1. Introduction

Self-regulated learning (SRL) is now an important topic in education and in educational research, and SRL is seen as a necessary requirement for successful life-long learning and prepare students to be effective workers and citizens in the future in the 21st Century. Self-regulated learners are skillful at monitoring their learning and comprehension which has a direct effect on each step in the self-regulation process. It could be analogized with monitoring to the automatic water sensor faucet. When our hands are brought into a sink of LED sensors IR (Infrared LED) will read, then automatically taps will drain the water. Conversely, if not required taps will stop flowing automatically; when a learner is confused or does not comprehend what they are studying the monitor tells the learner to regulate their behavior, metacognitive strategies for critical thinking, strategic action (planning, monitoring, and evaluating) or motivation and affect to increase learning. SRL will be more optimally if using be supported by appropriate strategy and appropriate tools. Mind Maps is a useful strategy that helps students learn more effectively, improves the way they record information, supports and enhances their creative problem solving and being valuable at improving students' critical thinking disposition. Mind Maps are also improve metacognitive self-regulation such as planning, monitoring and regulating refers to the awareness, knowledge and control of cognition. Time management involves planning and managing one's study time while study environment management refers to the setting where the student does her class work (Tanriseven, 2014). Mind mapping strategies applied using software IMindMap --in this case is digital mind mapping--, very practical and effective in pouring the ideas in the mind map, especially regarding the flexibility of changing (editing), free space settings and not have to worry if it is not symmetrical, further optimize the speed of creative thinking, and more flexible as well as markedly in presentation (Windura, 2013).

Mind Mapping Strategies

According to Buzan as a founder mind maps (1996, p.59), the mind map is defined as "an expression of Radiant Thinking and is therefore a function of the human mind. It is a powerful graphic technique which provides a universal key to unlocking the potential of the brain". The mind map has four essential characteristics: The subject attention is crystallized in a central image. The main themes of the subject radiate from the central image as branches. Branches comprise a key image or key word printed on an associated line. Topics of lesser importance are also presented as branches attached to higher level braches. The braches form a connected nodal structure. The use of mind mapping can be assisted with "the adoption of colors, images, codes, and multidimensional approaches to help human memory, so that one could concentrate the mind on the central part, which is, the crucial subject" (Chen, 2008, p.1034)

According to Mona and Adbkhalick (2008) mind mapping is important, effective and useful for students to structure their understanding of environmental concepts in a way which can help the students to be effective. Note takers and which can generate new ideas and associations that they have not thought of before. Graphics organizers assists learning by providing an opportunity for visual, stimuli, brain storming, recording information in none leaner fashion, assessment, checking understanding, problem solving, elaboration, creating analogies, note taking, summarizing, illustrating sequence of events and other creative ways of instruction.

A Mind Map is the ultimate organizational tool. A mind map is the easiest way to put information into your brain and to take information out of your brain- it's a creative and effective means of note taking that literally "maps out"your thoughts. And it is so simple. Compares a mind map to a map of city. The center of your mind map is like the center the city. It represents your most important idea. The main roads leading from the represent the main thoughts in your thingking process; the secondary roads represents your secondary thoughts, and so on. Special images or shapes can represent sites of interest or particulary interesting ideas.

A concept map shows how knowledge is constructed in people's mind (Novak et al., 1984). Simply put, concept mapping is a tool for representing the interrelationships among concepts in and integrated, hierarchical manner (Chularut & DeBacker, 2004). In concept maps, students only focus on the definition of the concept, learn the connections of this concepts with other concepts. In mind maps, however, students make learning more effective by connecting the main concept to other

concepts by means of various symbols and images so as to facilitate recall of all these connections (Akinoglu & Yasar, 2007).

The literature so far primarily focuses on the two main positive outcomes of mind mapping, which are on students' academic achievement and attitudes. Mind mapping is "a creativity and productivity enhancing technique that can improve the learning and efficiency of individuals and organizations" (Mento, 1999). As mind maps function like our mind on the principle of radiant thinking (Buzan, 1996), they allow the user to connect each new thought to the ones that have come before. A mind map also allows the user to record a great deal of information on one page, and to show relationships among various concepts and ideas (Mento et al., 1999). Mind maps are used to form, visualize, conceive and classify thoughts in educational fields, organizational activities and problem-solving and decision-making processes (Akinoglu & Yasar, 2007). According to Farrand, Hussain & Hennessy (2002), study techniques which have incorporated imagery, color or the visual-spatial arrangement of key words significantly improve memory for information when compared with simple note taking or rote rehearsal. Like concept mapping, mind mapping promotes critical and transformational learning when the technique provides learners with opportunities to articulate their current knowledge, critique it, and view how their meanings and values have changed over time (Hill, 2006). In addition, mind mapping "brings a renewed sense of enthusiasm to the classroom because it tends to increase one's sense of competence in mastering the assigned materials" (Mento et al., 1999, p.405). They added, "in effect, mind mapping serves the purpose of enhancing one's intrinsic motivation".

Mind Maps as a visual tool is based on the placement of the main idea at the centre of the paper, and sub ideas are placed below the main idea by organising them hierarchically using shapes, images, codes, symbols and keywords (Goldberg, 2004). This process ensures the use of both lobes of the brain and their joint functioning, as it includes both analytical inference and special tasks (Brinkmann, 2003). Research examining the efficiency of mind maps on the learning process has shown that mind maps have positive effects on students' comprehension, retention (Aslan, 2006; Aydın, 2010), success (Abi-El-Mona & Adbkhalick, 2008; Akinoglu & Yasar, 2007; Cunnigham, 2005; Polson, 2004), attitude towards the course, concept learning (Akinoglu & Yasar, 2007), motivation (Goodnough & Woods, 2002; Keles, 2012; Polson, 2004), construction of knowledge (Dhindsa, Makarimi & Anderson, 2011; Eppler, 2006), metacognitive knowledge and problem solving (Ismail, Ngah & Umar, 2010).

Usages Of Digital Mind Mapping

The study confirms that mind mapping is the computer based tool which is critically effective for conceptualizing ideas, making connections between concepts, categorizing ideas and building new knowledge, problem-solving, critical thinking and collaborative learning. The mind map facilitates students' interaction and freedom to express their creative thinking. With these useful features, the mind map helped students improve their learning achievement more than they did in the conventional classes (Nong, et,al, 2006)

The improved achievement can be explained by the findings in similar studies on ICT-based mind mapping/ concept mapping that "the use of ICT-based concept mapping produced a wide range of graphic organization strategies, from mind mapping to concept mapping" (Riley & Ahlberg, 2004, p.253), "ICT capacity enables storage and revisiting of mapping and automatic functions, and creating concepts and vectors enable immediate linking and labeling that increase the ease and speed of mapping" (Riley & Ahlberg, 2004, p.253), and "ICT can be used to promote collaborative learning in group projects and new approaches to working, learning and interacting" (Scardamalia & Bereiter, 1994, Forcheri & Molfino, 2000, cited in Riley & Ahlberg, 2004, p.246).

Mind maps allow for us to make a note, prepare, create and deliver presentations, do personal or group brainstorm sessions, outline your projects, plans or life. You can pretty much do all the things you could do on paper as well. Still, there is of course a difference. Digital mind maps is usually less personal (using typed fonts) but is easier to update and edit. The biggest beauty though is, of course, that you can connect much easier to about any other digital resource. This could be another mind map, or Word documents, PDF files, folders on your computer, internet addresses, mail addresses, images,

video, etc. The map is no longer a simple overview. It turned into a visual resource that helps you create insight, overview, and clarity.

Self Regulated Learning

An extensive longstanding literature from the 1980s and 1990s (Ames & Archer, 1986; Pintrich & De Groot, 1990; Zimmermann & Pons, 1988) has defined self-regulated learning as the development of independent learning skills. More recently this definition has broadened to include "multi-component, iterative, self-steering processes that target one's own cognitions, feelings, and actions, as well as features of the environment for modulation in the service of one's own goals" (Boekaerts, Maes, & Karoly, 2005)

From Wikipedia, the free encyclopedia The term self-regulated (process of taking control of and evaluating one's own learning and behavior) can be used to describe learning that is guided by metacognition (thinking about one's thinking), strategic action (planning, monitoring, and evaluating personal progress against a standard), and motivation to learn (Butler & Winne, 1995; Winne 1995; Zimmerman, 1990; Boekaerts & Corno, 2005).

Self-regulated learning is the ability to be an active participant in Metacognition, motivation, and behavior in the learning process (Zimmerman, 1989). As for metacognition, that self-regulated learners plan their own learning process, set goals for themselves, organize their own learning tasks, monitor themselves closely in the process of learning, and continually evaluate their own learning process. As for a motivated learner is one who is a real self-starter in the process of learning. Motivated learners display exemplary effort, persistence, and perseverance in the learning process (Schunk, 1986). In motivation, they feel themselves competent, selfefficacious, and independent (autonomous). The third component of self-regulated learning is action, or what Zimmerman (1990) has called 'behavioral process'. Wang and Peverly (1986) and Henderson (1986) defined the behavioral process as the process whereby self-regulated learners "select, structure, and create environments" that are conducive and facilitative to optimized learning (cited in Zimmerman, 1990, p. 5).

Pintrich define Self-regulated learning, is an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment (Pintrich, 2004; Schunk, 2005). To self-regulate means "to change … oneself, or some aspect of oneself, so as to conform to some idea or concept" (Forgas, Baumeister, & Tice, 2009, p. 4). Self-regulation of learning takes place if students direct their own learning (Boekaerts, & Corno 2005). Selfregulated learning is generally characterized as an active participant who control efficiently their own learning experiences by different ways, including determining a productive work environment and use of resources effectively, organize and train information to learn, maintain positive emotions during your academic assignments, and maintaining a positive motivational beliefs about their ability, the value of learning, and the factors that affect learning.

In General, researchers who studied the self-regulation academic seeks to understand how learners become expert over their learning processes themselves. In a sense or the specialty of this definition is how and why the learner chose to use specific strategies or processes. In terms of the main privileges or self-regulated learning is metacognition. Metacognition with regard to consciousness (awareness), knowledge (knowledge), and control of cognition. Three activities that build process setting themselves (self-regulatory) Metacognition is planning, monitoring, and settings (regulating). learner self-regulation (self-regulation learners) learning through experience and reflection of the self (self-reflection). Teaching or helping students to become self-directed learners (Zimmerman, 1989). Self-regulated learning is particularly suitable for students, because they have great control exceeds the plan of their own time, and how they approach the lessons and learn them (Pintrich, 1995).

Digital Mind Mapping as a Self Regulatory Instructional Strategy

As teachers represent one of the most important factors that influence students' learning and the development of self-regulation skills, it is necessary to develop the self-regulation skills of teacher

candidates during their elementary education. In this context, it is possible to say that studies on the development of self-regulation skills among teacher candidates, and on the role of mind maps in developing self-regulation skills, will contribute significantly to effective learning during teacher education. In particular, planning and time management strategies comprise important cognitive structures of self-regulation for academic success (Zimmerman & Risemberg, 1997, cited in Eilam & Aharon, 2003). Therefore, the use of mind maps by elementary teachers as a planning tool in the learning process will develop their self-regulation skills, increase their motivation, and thereby contribute to the setting of a model for their students' self-regulation. Furthermore, despite the fact that there are numerous studies regarding the effect of mind maps on learning, there are no previous studies regarding its effects on self-regulation. In this respect, it is believed that the current study will contribute to the development of a new perspective and understanding regarding the development of self-regulation skills among teacher candidates. It is further believed that it will contribute to teacher candidates' ability to implement what they have learned, and that it will serve as a basis for future studies. The use of mind maps and task planning tools will provide teacher candidates with the opportunity to structure their own learning.

Based on research, mind maps as a self regulated learning strategy students' performance can be improved upon in Basic Science Technology. Mind maps as a self regulated learning strategy helps students to associate ideas, think creatively, and make connections that one might not otherwise make in the conventional approach. As mind-mapping is a useful technique that helps students learn more effectively, improves the way they record information, supports and enhances their creative problem solving and being valuable at improving students' critical thinking disposition, teachers should adopt it as a method for teaching Basic Science and Technology (Adodo, 2013).

According Tanriseven research, the experimental group, which planned tasks by using mind maps, had higher scores than the control group in the elaboration, organization, metacognitive self-regulation, time and study environment, and effort management strategies (Tanriseven, 2014). Self-regulation strategies ensure that knowledge is activated in working memory, that the newly learned are associated with pre-learning, that correlation is made between information, and cognition is controlled (Pintrich, 1999; Pintrich et al., 1991). Elaboration strategies including paraphrasing, summarizing and generative not-taking help students store information into long-term memory while organization strategies help the learner select appropriate information and also construct connections among the information to be learned. Also metacognitive self-regulation such as planning, monitoring and regulating refers to the awareness, knowledge and control of cognition. Time management involves planning and managing one's study time while study environment management refers to the setting where the student does her class work. Effort management reflects a commitment to completing one's study goals, even when there are difficulties (Pintrich et al., 1991). Based on all the results it can be said that planning with mind maps has a positive effect on the use of pre-service teachers' self-regulation strategies (Tanriseven, 2014), have a positive effect on the students' motivation (Goodnough & Woods, 2002; Keles, 2012; Polson, 2004), and it can be said that task planning with mind maps has a positive effect on intrinsic goal orientation and self-efficacy perception (Tanriseven, 2014).

2. Conclusion

The description of self-regulated learning, mind mapping and the review of the literature both presented above indicate that to be self-regulated, learners to regulate their motivation, cognition in this contexs the development of metacognitive (thinking about thingking) skills and behavior in the process of learning. Self-regulated learners regulate their cognition by such strategies as planning, organizing, monitoring and evaluating their learning processes. If associated with the use of mind maps, then its great similarity in the function both to improve metacognitif skills and motivation of students during the learning process. Strengthened by the use of mind maps can also enhance the ability of the elaboration, organization, metacognitive self-regulation, time and study environment, and effort management strategies. Furthermore, the use of mind maps by teachers as a planning tool in the learning process will develop their self-regulation skills, increase their motivation, and thereby contribute to the setting of a model for their students' self-regulation (Tanriseven, 2014). The use of mind maps and task planning tools will provide teacher candidates with the opportunity to structure

their own learning. How to make it easier make mind maps is use digital mind mapping. Digital mind maps is easier to update and edit. Another advantage of the digital mind mapping of course, that you can connect much easier to about any other digital resource. This could be another mind map, or Word documents, PDF files, folders on your computer, internet addresses, mail addresses, images, video, etc. The map is no longer a simple overview. It turned into a visual resource that helps you create insight, overview, and clarity.

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