

THE STUDY OF MIND MAPPING WITH COLLABORATIVE LEARNING

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THE STUDY OF MIND MAPPING WITH COLLABORATIVE LEARNING

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Abstract

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In the twenty-first century, collaborative learning has attracted both researchers' and teachers' attention as an effective way of improving the quality of student learning and the effectiveness of teaching. Collaborative learning refers to the variety of educational approaches involving joint intellectual effort by students, or students and teachers together. Mind mapping, which originated in the 3rd century and popularized by Tony Buzan in the 1970, has been used to visualize ideas, improve learning, enhance problem solving ability, and cultivate critical thinking ability by educators and others.

This paper examines the pedagogical rationale, the characteristics, and the application of collaborative learning and mind mapping. This paper also studies the application of mind mapping with collaborative learning.

A literature review of collaborative learning and mind mapping is presented in the paper. The findings are summarized and recommendations are made.

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Chapter One: Introduction

In the twenty-first century researchers, educators, administrators, and teachers have been concerned about “how to improve the quality of student learning and how to improve the effectiveness of teaching and how to do both affordably and efficiently.” (Barkley, Cross & Major 2005) We cannot just spoon-feed and transfer information and subject matter to students through a lecture. Students must learn to absorb the information and knowledge and turn it into their own understanding. Only when students are actively involved in the study can meaningful and lasting learning occur (Barkley, Cross & Major 2005).

Collaborative learning has attracted attention and interest because “it helped solve several problems related to improving student learning and effective teaching.” (Barkley, Cross & Major 2005) Students can become actively involved in the study and therefore increase their learning. Not only do they master the subject matter, but they also can learn how to communicate with people, how to work as a group, how to respect different perspectives, and how to develop as continuing and lifelong learners. Teaching students to “listen carefully, think critically, participate constructively and work productively to solve common problems should be the priorities of all teachers.” (Barkley, Cross & Major 2005)

Collaborative learning provides students opportunities to become active participants in the learning rather than be passive recipients of knowledge from the teacher. By giving students more opportunities to discuss the subject matter in the classroom with their peers, collaborative learning can transform a tedious class into an interesting and dynamic one. Instead of accepting what is important to learn from the teacher, students take the initiative to create meaningful study. Listening, organizing, elaborating, practicing,

disagreeing and expressing ideas are much more important than looking for right answers. (Solner & Kluth 2008)

Mind mapping, originated from Porphyry of Tyros, the noted thinker of the 3rd century and popularized, methodized and standardized by Tony Buzan, the British educator and psychologist in the 1970s, is “a diagram used to represent words, idea, task, or other items linked to and arranged around a central key or idea.” (Mind mapping, Wikipedia, 2010) Jesen (1998) stated that mind mapping is an essential, effective and creative thinking tool for building up learning, apprehension, recognition, and perception since mind mapping appeals to both the left and right hemisphere of the brain by employing “patterns of both organized notes and symbols in the mind maps.” (Jesen 1998)

The hypothesis of this paper is that mind mapping with collaborative learning has overall, sensational, stimulating, dramatic effects on students’ learning. The hypothesis is supported by literature reviews on researches. Conclusions and suggestions are also provided.

Statement of the Problem

The questions addressed in this seminar paper are as follows. What are collaborative learning and mind mapping? What is the pedagogical rationale for collaborative learning and mind mapping? What are the characteristics of collaborative learning and mind mapping? What is the evidence that collaborative learning and mind mapping promotes and improves learning? And finally, what are the applications and effects that collaborative learning and mind mapping can have on students who are learning English as a foreign language?

Definition of Terms

Collaborative Learning “Collaborative learning is an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together. Usually students are working in groups of two or more, mutually searching for understanding, solutions, or meanings, or creating a product. Collaborative learning activities vary widely, but most center on students’ exploration or application of the course material, not simply the teachers’ presentation or explication of it.” (Smith & MacGregor 1992)

Mind Map “A mind map is a diagram used to represent words, ideas, tasks, or other items linked to and arranged around a central key word or idea. Mind maps are used to generate, visualize, structure, and classify ideas, and as an aid in study, organization, problem solving, decision making and writing.” (Mind mapping, Wikipedia, 2010)

Delimitations of Research

The research was conducted in and through the Karrmann Library at the University of Wisconsin-Platteville. Primary searches were conducted via the Internet through EBSCO host with ERIC, Academic Search Elite, China Academic Journal Electronic Publishing House, Google and Google Scholar. Key search topics included, “collaborative learning”, “mind mapping” and “mind mapping with collaborative learning.”

Method of Approach

A brief review of literature on the study of collaborative learning and mind mapping was conducted. A second review of literature was focused on cases of the application of mind mapping with collaborative learning. The findings are summarized and recommendations are made.

Chapter Two: Review of Literature

The word collaborative in Late Latin means collaborates, defined as, to labor together. Webster's Third New International Dictionary defines collaborate as "to work jointly especially with one or limited numbers of others." Collaborative learning means students work together instead of working individually. This activity can be referred to in other terms, such as cooperative learning, team learning, group learning, or peer-assisted learning. (Barkley, Cross & Major 2005) In this paper, the phrase collaborative learning was used to refer to any studying activities that require cooperation among group members. Although there is continuing debate and discussion about whether collaborative learning and cooperative learning mean the same thing, the two terms are used interchangeably in this study. The differences between collaborative learning and cooperative learning could be elaborated in another research paper by other researchers; however, it is not addressed here.

The Pedagogical Rationale for Collaborative Learning

Collaborative learning, which has drawn people's attention since 1990, is "deeply rooted in experiential learning and student-centered instruction." (Dubinsky, Mathews & Reynolds 1997) Philosopher John Dewey and cognitive psychologists Jean Piaget and L.S. Vygotsky have advocated this concept and endeavored to "understand how teachers can help learners deal with the tension between what students already know (their prior experience) and what is newly presented to them." (Dubinsky, Mathews & Reynolds 1997) They believed that learning is experiencing and learning is essentially social in nature. They emphasized that it is critical for teachers not to spoon feed the subject matter to students but to create a context where students are encouraged to learn, discover and explore by

themselves and regenerate their understanding of the knowledge. (Dubinsky, Mathews & Reynolds 1997)

Modern psychology and neurophysiology research has also shown that “people quite literally build their own minds throughout life by actively constructing the mental structures that connect and organize isolated bits of information.” (Barkley, Cross & Major 2005) It is important for teachers and educators to keep it in mind that “we cannot transfer our knowledge ready-made into student minds. Students must do the work of learning by actively making connections and organizing learning into meaningful concepts.” (Barkley, Cross & Major 2005)

Dubinsky, Mathews & Reynolds (1997) has pointed out that philosophical affirmation of collaborative learning can be found in recent social constructionism and in feminist theory and pedagogy. Social constructionism, an expanding web of epistemological perspectives in several disciplines, springs from the assumption that knowledge is socially, rather than individually, constructed by communities of individuals. Knowledge is shaped, over time, by successive conversations, and by ever-changing social and political environments. The knowledge business should not be just the territory of competing scholars or experts, the social constructionists argue; the shaping and testing of ideas is something in which anyone can participate.

Characteristics of Collaborative Learning

Haring-Smith (1994) stated that people can achieve more when they work collaboratively, no matter whether it is in the educational, psychological or business field. It is also revealed that when given the same tasks, people working collaboratively to solve

mazes or number puzzles can surpass people working individually. What's more, groups even solve more puzzles more precisely than brilliant people who work alone. (Haring-Smith 1994)

There are some differences between a traditional lecture and a class in which collaborative learning is employed. In a classroom where collaborative learning is used, three or more students will work together. They can move around in the classroom instead of sitting still in their seats. They need to search for answers themselves instead of waiting for their teacher to transmit the knowledge to them. There is no right answer or wrong answer. Students need to develop and defend their own ideas, not trying to estimate what the teacher wants. (Haring-Smith 1994)

Haring-Smith (1994) declared that collaborative learning asks you to “have the courage to recognize and speak your own ideas, respect the ideas and knowledge that other students bring to the class, and trust the teacher to listen to you with respect and to care about your idea.”

The relationship between the teacher and the other students in the class is redefined in Haring-Smith (1994).

Rather than assume that your mind is a blank slate, waiting to be written on by the teacher, collaborative learning focuses on the knowledge and experience that you bring to a classroom. It works by finding out what you know and then allowing the teacher to respond and give you exercises that will let you learn. The teacher does not digest all the knowledge and feed it to you like the predigested food fed to baby birds. The teacher does not report her learning. You learn for yourself, and the teacher is there as a kind of coach to guide your learning, to point you to important

ideas and books, to give you exercises that will help you sharpen your skills.

Application of Collaborative Learning

Simon (1992) stated that “the real test of learning is to be able to explain what you have learned in your own terms and be able to apply it to new situations”. The traditional way of spoon-feeding information and knowledge to students and rote learning are the barriers and obstacles to student learning. In order to improve student learning and understanding in the courses, some instructors and professors from Harvard University in 1992 conducted experiments on collaborative learning with students who took courses in physics, astronomy and chemistry.

The Physics Professor from Harvard University, Eric Mazur, referred to collaborative learning as “peer instruction”, and reported that there were dramatic and striking results after he had employed collaborative learning in his Introductory Physics class at Harvard University. After explaining some basic Physics concepts in his lecture, Professor Mazur would ask his students one multiple choice question about one concept. He then asked the students to check their confidence level about the answer on the scale form which ranged from one to five. The number five indicated that they are quite confident about the answer. Students had one minute to answer the question and one minute to talk to their neighboring classmates and convince them their answers. After this, students could revise their confidence level of the answer.

Mazur came to the conclusion that the collaborative learning technique is quite expressive and three striking changes have taken place in his class. First, the attendance in his class became higher and seldom students would miss his class. Second, students became more observant and attentive in his class. Third, the data showed that “there is a major

improvement in understanding of the basic Physics concept.” (Simon 1992) Correct answers rose dramatically from almost 40% before the technique to almost 80% after the technique. Students’ confidence level of the answers has definitely improved from less than 40% before the technique to almost 60% after the technique. (Simon 1992)

Philip Sadler, who taught celestial navigation at Harvard University, used the same strategy as Mazur. He encouraged more active learning in his class by giving students more time and freedom to discuss and study in several small groups. In order to adjust the speed of the work, occasionally he would answer questions from the group who worked slowly and posed some tough question to the group who worked fast. Based on the evaluation from his students, Philip Sadler was convinced that, “in my class, they are much more participatory. Kids got to talk a lot more. I have direct interaction with students. More learning takes place. When students leave the course, they feel like they can teach the subject themselves. And they have fun.” (Simon 1992)

Another good example could be found from the work of Eric Chehab, a teaching assistant in Chemistry at Harvard University. He let his students form their own groups of three and then would spend equal time with each group to give them instruction and guidance. Professor Chehab emphasized to his students that, “they need to be receptive to collaborative learning and be well-prepared to be successful in the class. Otherwise, they would be left out and feel embarrassed.” (Simon 1992) What Chehab learned from this experimentation was that the best part about collaborative learning is that “it is funny to see how students make friends, and they stay together as friends, and see them work on problems in the new courses together.” (Simon 1992) One anonymous student made a comment on his experience of learning collaboratively that “students who understands

better than I can would be able to work with me and finally I will understand it in my own terms. Once you understand everything in your own terms, I think, by definition, you are gonna to retain it a lot better.” (Simon 1992)

However, Jim Davis, another Chemistry instructor from Harvard University pointed out that “collaborative learning works best for students who are in the middle. For the weak, they have trouble and do not know what to do at all. For the best, they spend more time working on the finer points; already understanding the fundamental that everybody else needs helps on.” (Simon 1992)

Jim Davis’ opinion was confirmed by another anonymous student, who commented that “I think the key factor is the level of other people in the particular group. I know that I want to learn things I don’t understand. I find it not as useful for me if I spend most of my time explaining much more basic concepts to somebody else. I need to learn stuff, as well.” (Simon 1992) Zheng (2009) has also suggested that collaborative learning is more useful to students who are at an advanced level who have acquired the fundamental knowledge and are ready to discuss and assess.

Haring-Smith (1994) has pointed out collaborative learning is notably useful when people are writing. It is crucial to have other people to talk with and to be the readers to continue the writing and make the writing more interesting. When people write alone, it is hard to keep the work objective and to see whether the writing has been clear and explicit. Since writing involves both a writer and a reader, it almost demands to be investigated collaboratively. (Haring-Smith 1994)

Different Views on Collaborative Learning

The hypothesis that students prefer collaborative learning over individual learning came into question in a study conducted by Cotter (2005). In the beginning, students had received both collaborative learning and individual learning at two adult learning centers, Campus Adult Learning Center and Kenosha County Job Center, Wisconsin, USA. Later, they were surveyed on whether they preferred collaborative learning or individual learning. The survey was made up of three parts, the student demographics and attitudes about the two adult learning centers, their choice about the collaborative learning approach vs. the individual learning approach, and an open-ended question about why they had made these choices. The gathered data was evaluated and the results of the survey suggested that the majority of the participants prefer individual learning. Participants gave a variety of reasons for preferring the individual learning approach. For example, working with other students who are not at the same level is difficult. Some students have ADHD (attention deficit hyperactivity disorder) and cannot concentrate in a group. (Cotter 2005)

Furthermore, Haring-Smith (1994) stated that “not all classes should be taught through collaborative learning all the time. People learn differently, and there is a time when lectures are the most efficient way to communicate ideas. If all classes were run collaboratively all the time, students and teachers alike would be frantic for some simple way to convey basic information. We need textbooks, libraries, teachers, laboratories, and each other to learn. Some subjects and skills are also more easily learned alone.” (Haring-Smith 1994)

Mind Mapping

“Mind maps have been used for centuries in learning, brainstorming, memory, visual thinking and problem solving by educators, engineers, psychologists and others.” (Mind map, Wikipedia, 2010) The earliest example of mind map was found in Porphyry of Tyros, the noted thinker of the 3rd century, when he vividly created the concept categories of Aristotle. (Mind map, Wikipedia, 2010) Buzan, Dottino & Israel (2007) has stated that great brains like that of Leonardo da Vinci employed images, pictures, arrows and other connective devices while taking notes, learning and remembering. Since they use both sides of their brain to learn and remember, they performed better than those people who made only linear notes. Once Buzan made such discovery, he started to apply this approach and “began the evolution of Mind Mapping, a major new tool for optimizing how we use our brains to create, plan and develop ideas.” (Buzan, Dottino & Israel 2007)

Wycoff (1991) provided instructions on how to make a mind map: “A central focus or graphic representation of the problem is placed in the center of a page; ideas are allowed to flow freely without judgment; key words are used to present ideas; one key word is printed per line; key words are connected to the central focus with lines; color is used to highlight and emphasize ideas; and images and symbols are used to highlight ideas and stimulate the mind to make connections.”

How Mind Mapping Works

Strong memory patterns are created when people have active involvement with the learning material by taking notes through mind mapping. Images are created, materials are organized, associations and connections are made. “Mind mapping actively engages both hemispheres of our brains. By allowing us to freely interact with information and by adding

color, symbols and organization to the information as we receive it, mind mapping helps us develop the full potential of our minds. We develop better memory, more powerful organizational skills and more creativity.” (Wycoff 1991)

Wycoff (1991) also stated the mind’s attention span is no more than five and seven minutes. It is immensely short and it is affected by the subject matter and level of interest. Best learning can result if the learner can make the best use of these short bursts of activity. “Mind mapping takes advantage of the tendency of the mind to work in short, intense mind bursts by allowing you to dump your ideas and thoughts onto paper in just a few minutes.” (Wycoff 1991)

As Buzan was promoting and exploring this technique, he realized that there were definite benefits gained from each element of mind mapping. These elements are:

1. Puts the graphic representation of the problem or the central focus of an image in the center of the page. Buzan (2006) believes that the brain is radiant. It thinks centrally and it explodes out in all directions. Jesen (1998) stated we don’t think in the corner. Most of the things occur in the center of our brain. When we close our eyes and picture our best friends, favorite food or favorite traveling spot, those things come into our mind in the center (Jesen 1998). Buzan & Buzan (1993) has also stated that “the full power of the Mind Map is realized by having a central image instead of a central word, and by using images wherever appropriate rather than words.” (Buzan & Buzan 1993)

2. Allows ideas to flow freely without judgment. “A mind map is a thinking tool that reflects externally what goes on inside your head and because it is your way to get the most out of your mind, any system which makes sense to you is right.” (Wycoff 1991)

Buzan & Buzan (1993) has also stated that “the Mind Map laws are intended to increase, rather than restrict, mental freedom.” (Buzan & Buzan 1993)

3. Places one key word to represent ideas per line. Creative (2002) has pointed out the importance of having one word per branch because the single word per line gives you much more freedom, much more creativity and much more clarity. Ideally, the length of the word should be the length of the branch. The two words are in space very close, i.e., they are connected. Buzan & Buzan (1993) has pointed out that “combining the two cortical skills of words and images multiplies your intellectual power.” (Buzan & Buzan 1993)

4. Connects key word ideas to the central focus with lines/branches. Creative (2002) argued that branches are a reflection of the way the brain thinks. The brain thinks by imagination and association. If you do not have associations, you do not have connection. If you do not have connection, you do not have memory and you do not have thinking. Every genius uses image and association. The mind map is the process by which you can do that. Using his own techniques, Buzan says he learned conversational Spanish in forty hours. (Creative 2002) Buzan & Buzan (1993) further stated that “once the human brain realizes that it can associate anything with anything else, it will almost instantaneously find associations, especially when given the trigger of an additional stimulus.” (Buzan & Buzan 1993)

5. Uses color to highlight and emphasize ideas. Studies from Creative (2002) at London University has proven that people who use color and image in their imagination when they are learning and trying to remember, inevitably, do better than those who do not. Jesen (1998) has stated that “color, like music, has the ability to tap into the emotions, also allows us to create a whole new coding system into our brain.” (Jesen 1998)

6. Uses images and symbols to highlight ideas and stimulate the mind to make other connections. Wycoff (1991) came to the conclusion that learning is about making connections. Once connections are made, it is easier to remember and recall information later. It is easier for the brain to process and perceive images and symbols. “Adding symbols and images to your mind maps will help communicate your message visually to your mind or to the mind of your audience. Whenever you can communicate your message in several ways, the chances of that message being received fully will increase.” (Wycoff 1991) Buzan & Buzan (1993) advanced the idea that an image can automatically draw the eye and brain’s attention. It is an effective memory aid since it could activate and generate abundant associations and connections. What’s more, “an image is attractive----on many levels. It attracts you, it pleases you and it draws your attention to itself.” (Buzan & Buzan 1993) Pictures explain words. Liu (2008) has also suggested using the imagination to improve the mind map and has indicated that drawing pictures next to the key words saves her time and energy, liberates her from taking complicated notes and increases her learning. (Liu 2008)

By employing these elements into the mind maps, a long list of uninteresting information can be turned into colorful, memorable, highly organized diagrams that reflect the brains natural way of thinking and encourages synergetic thinking. (Creative 2002)

“The Mind map is not only using images, it is an image. The Mind Map harnesses the full range of cortical skills-----words, images, numbers, logic, rhythm color and spatial awareness----in a single uniquely powerful technique. In so doing, it gives you the freedom to roam the infinite expanse of your brain.” (Buzan & Buzan 1993)

Application of Mind Mapping

Mind mapping can be used in many ways. Any field which involves information or organization can benefit from this technique: writing, project organization, brainstorming, meetings, “To Do” lists, presentations, note taking, foreign language classes, family budgeting, business situation, and even personal growth (Wycoff 1991). Anything you want to do in terms of thinking, contemplation, cognition, remembering, creating, the mind map is the ideal tool for that. Mind mapping is like letting the brain talk to itself. (Creative 2002) Mind mapping is the visualized picture of “Radiant Thinking” and therefore it is also suitable for people who are in the design and art fields.

Research has shown that applying correctly the creative thinking mind mapping technique can facilitate individual mind map makers to create at least twice as many innovative ideas in the same period of time as a traditional large brainstorming group. (Buzan 1993) And because a mind map captures a specific topic in a nonlinear fashion and incorporates graphics and colors, this exercise can connect with learners whose style is not as well-served by traditional linear, text-based materials. (Budd 2004)

Mind maps are effective tools to foster creativity. David Kelley, founder of IDEO and the Hasso Plattner Institute of Design at Stanford, commented that people in Silicon Valley like to improve thinking, have new ideas, strategize by making mind maps. Mind maps are especially helpful when they could demonstrate the relation and association between seemingly irrelevant ideas. You will get greater and greater ideas once you oblige yourself to follow the branches on the map in your mind. “The coolest thing is that you allow yourself to follow your inner thoughts, which is different than making a list where you are trying to complete and deal with data.” (BusinessWeek 2006)

Buzan & Buzan (1993) stated that mind mapping is an essential way to cultivate the learners' thought, perception, memory and creativity. Mind mapping has many employed images in it. And images are "more evocative than words, more precise and potent in triggering a wide range of association, thereby enhancing creative thinking and memory." (Buzan & Buzan 1993) Mind mapping has revitalized the visualizing ability in the brain. Consequently, it has improved the learners' thinking ability, perceptual abilities, memory and confidence. (Buzan & Buzan 1993)

The argument that mind mapping is a uniquely appropriate learning tool is supported by the finding from an experiment carried out by Bull and Whittrock in 1973. (Buzan & Buzan 1993) Bull and Whittrock divided 9 and 10-year-old children into three groups to learn words such as brain, magazine, trouble and truth. The children from Group 1 were required not only to read the word and its definition, but also to write them down and create their own images of both the word and its definition. The children in Group 2 were given the same task, but they were not required to make their own images. They just traced a picture. The children in Group 3 learned the word by writing down the word and its definition again and again. Tests of the words and their definition were given to the children one week later. According to the test results, the children in Group 1 made the best achievement and the children in Group 3 had done the worst. (Buzan & Buzan 1993)

The proof of the effectiveness of mind maps could be best summarized by Buzan & Buzan (1993)

Mind Maps combine notes taken from the external environment (lectures, books, journals and the media) with notes made from the internal environment (decision-making, analysis and creative thought)...The nearly identical

nature of the creative thinking and mnemonic principles confirms the Mind Map as the essential and natural manifestation and tool for these forms of thought. It also lays the foundation for the claim that, in opposition to the bulk of literature on creativity and memory, the two processes, rather than being separate, distinct and to many theoreticians opposites, are in fact mirror images of the same process. (Buzan & Buzan 1993)

Jesen (1998) stated that “my experience of teaching and using mind mapping over the years is that, when you use it, not only can you understand things better, recall goes up, but also you can usually average somewhere between eighty percent or one hundred percent of the message recalled. For me, the big bottom line is that I have more fun and I enjoy the learning process.”

Not only is mind mapping an effective way of improving the quality of student learning, it is also an effective assessment tool for teachers to “guide curriculum planning and classroom practice.” (Goodnough & Long 2006) Goodnough & Long conducted a ten-month study, from September 2002 to June 2001, about the effectiveness of mind mapping as an assessment tool in a grade six science class in a small, private, independent school in upstate New York, USA. Goodnough & Long collected data through semi-structured interviews with each student, field notes taken while observing for instructional periods, open-ended questionnaire about student understanding and perceptions of mind mapping, and documents which provided both the teacher and student perspective on the project. Based on the evidence collected from the study, Goodnough & Long (2006) concluded that “mind mapping has the potential to be a flexible assessment tool to ascertain students’ developing ideas about scientific concepts and ideas. Mind mapping provides a unique

window into the development of students' understandings in science, while simultaneously providing a venue for students to express their creativity and individuality.” (Goodnough & Long 2006)

Goodnough & Long (2006) also pointed out that the use of mind mapping is consistent with Howard Gardner's Theory of Multiple Intelligences, which is “a pluralistic conception of intelligence posited on the existence of eight distinct intelligences: verbal-linguistic, logical-mathematical, visual-spatial, musical-rhythmic, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist. (Gardner 1999) Multiple Intelligences Implications (2003) has suggested that having the person develop a mind map for a given area of study is a way of cultivating the person's Visual-Spatial Intelligence and Intrapersonal Intelligence.

Not only is mind mapping an effective way of learning, it is also helpful to children who are deaf and use American Sign Language. (Margulies 1991) Margulies (1991) has argued that “mind mapping, precisely because it is a visual language, is similar to sign language in its emphasis upon spatial relations, concepts, icons, pictures, and nonlinear representation.” (Margulies 1991) Sacks (1989) also pointed out that

Mind mapping is not by any means a written sign language, but it can provide children who are deaf with the many benefits of writing their ideas on paper. It provides a method for recording ideas that does not require English grammar. It requires some key words, symbols, use of space and color, and a comfort with visually representing ideas. For these visual tasks, people who are deaf are generally better qualified than most of their hearing counterparts. Most importantly, it is a visual system and as such is well

suiting to those who use American Sign Language and are acknowledged visual experts. (Sacks 1989)

Although numerous studies show that mind map is an effective study strategy for students to improve learning, Farrand, Hussain & Hennessy (2002) pointed out that sufficient training on mind mapping needs to be provided to students to help them get rid of the anxiety, reluctance and resistance of using the new memory strategy. Farrand, Hussain & Hennessy (2002) suggested that it is essential to incorporate some training courses on mind map with other curriculum at the initial stages of a curriculum, because there is a possibility that students are not willing to use some memory strategies which they are not familiar with. (Farrand, Hussain & Hennessy 2002) That statement was based upon the study conducted at Barts and the London School of Medicine and Dentistry, University of London. Fifty medical university students voluntarily participated in the study on factual recall from written information. After they had answered one set of questions from a 600-word passage of text, they were randomly divided into two groups: the “self selected study technique” group and “mind map” group. Students in the mind map group were given a 30-minute training on mind mapping, while students from self selected study technique were required to use whatever study strategy suits them, except mind mapping. Later, all the students were given another set of questions. Farrand, Hussain & Hennessy were surprised to find that the motivation in the mind map group is significantly lower than the self selected group even though the mind map group had better performance in recalling more correct items than the self-selected group.” (Farrand, Hussain & Hennessy 2002)

The Application of Mind Mapping with Collaborative Learning

Yan and Wang (2007) suggested that it is not enough for students to know what it is. They also should know how to use it and why. Since mind maps visually show the knowledge constituted by facts, concepts, proposition or theory, it can play a vital role in collaborative learning. (Yan and Wang 2007) It can train the learner to improve the memory. It is an ideal tool for self expression, communication and thus is a very efficient tool for collaborative learning. (Yan and Wang 2007)

Gao (2007) has shown a practical guide on how to make mind maps with collaborative learning. Firstly, each member draws out the information they have mastered and engaged in brainstorming. Secondly, they shared their mind maps with each other and discussed which factors are necessary and more important. Finally, they make a new one together which combines the good points of each mind map and some new concepts. During this collaborative learning, all ideas are taken into consideration and all members are encouraged to take part in it and hence, their sense of responsibility is enhanced. As the students are engaged in the active and collaborative learning, the cooperation between students has been facilitated. The team spirit is high. (Gao 2007) Once the students learned how to cooperate with each other and respect different views and perspectives, they are better prepared for the future career. (Barkley, Cross & Major 2005)

Budd (2004) has shown two in-class exercises in which small groups of students make Mind Maps in a labor relations course at the University of Minnesota. Based on the experiment, Budd (2004) concluded that the mind mapping in a small group is an active and collaborative learning exercise and a deeper analysis of the topic is strengthened by the creation of Mind Maps in small groups. When circulating around the class and observing

student learning, the instructor not only has more opportunity to communicate with the students in a more personal manner than a traditional chalk-and-talk lecture affords, but s/he also could observe the extent of participation and help the more passive group members to be more active. (Budd 2004) What's more, "varying the nature of instructional materials for a single individual over time has biological, cognitive, and motivational underpinning." (Budd 2004)

Pattanasettakul (2008) has demonstrated an experiment with students from Primary Four who studied social studies and Thai history and has shown that students can gain the knowledge better and improve their learning after they use mind mapping with collaborative learning. This teaching strategy has not only made the students feel happy to learn and enjoy their learning, but it has also increased the students' chance of success. Students have improved the social skills in their life by working collaboratively with their classmates. This teaching strategy is so successful that teachers who worked with Pattanasettakul in Primary Four had also followed her. (Pattanasettakul 2008)

Pattanasettakul (2008) also emphasized that the important thing that she has to realize is how to use this strategy (mind mapping with collaborative learning" and get success at most at the same time. Collaborative learning is not only used with the students but it is also used with the other teachers. "I will use these strategies in my class as a possible (sic), and I will share this strategy to other teacher at the other grade level." (Pattanasettakul 2008)

Pei (2007) revealed that it is applicable to have collaborative learning and the teaching mode based on mind mapping. Collaborative learning with mind mapping not only facilitates communication among learners, but also between learners and instructors. The

process of making and using mind mapping is the process of conversational communication and personalized study. The communication between the teacher and students, the communication among the students will cultivate team spirit and the sense of unity. Therefore, it is an essential way to enhance the quality of student learning and teaching effectiveness. (Pei 2007) Shang (2004) declared that the best study is personalized study, the best teaching is conversational study, and the best education is being self-educated. (Shang 2004) The characteristics of collaborative learning and mind mapping make it an ideal teaching strategy to be applied in foreign language study, which requires effective collaborative communication. (Pei 2007)

When sharing experience of how to keep the students' brain working, Phil Beadle, the Teaching-Award Winner of 2004 in the United Kingdom, attributed his success to the application of collaborative learning with mind mapping in his class and commented that "if you teach them (the students) this technique (mind mapping), note-taking in lesson will never be a chore but a pleasure." (Griffiths, 2007)

The effectiveness of mind mapping with cooperative learning (MMCL) has also been proven by a study completed by Ismail, Ngah, & Umar (2010). One hundred and twenty-seven computer science students from two classes in three Universiti Teknologi MARA campuses, Malaysia, were chosen by random and assigned to the treatment group and control group. The study showed that "mind mapping with cooperative learning method is preferred and the students in MMCL have significant positive overall effects in programming performance, problem solving skill, and metacognitive knowledge. (Ismail, Ngah, & Umar 2010)

CHAPTER THREE

CONCLUSIONS AND RECOMMENDATIONS

This paper examined what pedagogical rationale for collaborative learning with mind mapping and what benefits mind mapping with collaborative learning can bring to the process of learning. Collaborative learning is an effective way to help learners develop social skill, interpersonal skills, and problem-solving skills. Mind mapping is helpful for learners who try to improve their memory, cultivate organizational skills or seek creativity. Furthermore, mind mapping becomes an effective and critical way of helping children who are deaf and who use American Sign Language to improve their learning since mind mapping employs pictures and emphasizes nonlinear knowledge.

Collaborative learning with mind mapping is a student-centered approach which brings about student active learning. It is an ideal tool for self expression, communication, and cooperation. It is an effective way of using the whole-brain thinking, improving the learners' memory, enforcing the students' participation, strengthening the cooperation among the students, facilitating the communication between the teachers and students, enhancing students' critical thinking and impacting student achievement.

The existing literature on the topics leads to the conclusion that mind mapping with collaborative learning is an effective way of improving the quality of students' learning and the effectiveness of teaching.

Furthermore, the features of collaborative learning and mind mapping make it a potential teaching strategy to be applied in foreign language study, where effective

collaborative communication is required. More research is needed to explore the use of collaborative learning with mind mapping in a foreign language class teaching.

However, analysis of the literature also indicates that, as a strategy to improve the process of learning, collaborative learning with mind mapping should not be taught in classes all the time. People learn differently, and there is a time when lectures are the most efficient way to communicate ideas. Some subjects and skills are also more easily learned alone. It has also been acknowledged in a study conducted by Cotter (2005) that adult students prefer individual learning over collaborative learning.

Based on evidence collected for this paper and my opinion, collaborative learning with mind mapping has the strongest impact on learners who have no higher education than university level. It is recommended that before collaborative learning with mind mapping are employed in the process of teaching, sufficient training for both the teachers and students should be established so as to bring about the best results of this teaching strategy.

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