

## LEARNING MIND MAP FOR CREATIVE THINKING

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### Abstract

Learning Mathematics should be given to all children as a basis for logical thinking, analytical, systematic, critical, and creative, as well as the ability to cooperate. Creativity is essentially a person's ability to create something new in the form of ideas and real work in the form of new works as well as a combination of things that already exist. Creativity in mathematics is known as creative thinking. Learning Mind Map is a learning technique that utilizes the entire record of the brain by using visual images and other graphical infrastructure to form an impression of the more interesting so that students can describe the concept of a material with their own creativity in terms of both language and symbols. Through the Mind Map, we can see the whole description of the material we are studying, activates the whole brain works to develop and plan the direction of mind maps, solve a problem by making a creative breakthrough, it is easier to remember the information in a clear and easy to understand, and get something fun and creative

**Keywords:** Mathematical Creativity, Learning Mind Map

### Abstrak

Pembelajaran Matematika harus diberikan kepada semua anak sebagai dasar pemikiran logis, analitis, sistematis, kritis, dan kreatif, serta kemampuan untuk bekerja sama. Kreativitas pada dasarnya adalah kemampuan seseorang untuk menciptakan sesuatu yang baru dalam bentuk gagasan dan karya nyata dalam bentuk karya baru serta kombinasi dari hal-hal yang sudah ada. Kreativitas dalam matematika dikenal sebagai pemikiran kreatif. Peta pikiran (mind map) adalah teknik pembelajaran yang memanfaatkan keseluruhan catatan otak dengan menggunakan gambar visual dan infrastruktur grafis lainnya untuk membentuk kesan yang lebih menarik sehingga siswa dapat menggambarkan konsep materi dengan kreativitas mereka sendiri dalam hal kedua bahasa tersebut. dan simbol. Melalui Peta Pikiran, kita dapat melihat keseluruhan deskripsi materi yang sedang kita pelajari, mengaktifkan keseluruhan otak bekerja untuk mengembangkan dan merencanakan arah peta pikiran, memecahkan masalah dengan melakukan terobosan kreatif, lebih mudah mengingat informasi di dalamnya. yang jelas dan mudah dimengerti, dan mendapatkan sesuatu yang menyenangkan dan kreatif.

**Kata Kunci:** Kreativitas Matematika, Pembelajaran Peta Pikiran

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## INTRODUCTION

Learning mathematics needs to be given to all children as a basis for logical, analytical, systematic, critical, and creative thinking, and the ability to work together. These competencies are needed, therefore, children can have the ability to acquire, manage, and utilize information in order to survive in an ever-changing, unsettled and competitive circumstance.

Learning mathematics in schools is implemented in order to achieve learning outcomes in the form of mathematical skills. One of the skills is learning to be able to implement and do something effectively, learn to build and find out the identity through active, creative, and fun learning process to grow the creativity. Through creativity, a student can express his thoughts and feelings optimally. According to Sizer (Johnson, 2010: 181), school means learning to use the mind appropriately, think creatively to deal with important issues, and inculcate the habit of thinking. Therefore, learning creatively means developing talents, optimally learning to use self ability, exploring new ideas, and developing environmental awareness.

The use of various models of mathematics learning has been done by teachers, by strengthening of learning techniques, hopefully the learning process can be done successfully. Munandar (2004: 37) mentions that the personal creative characteristics which are primary and secondary school teachers most desired include:

- (1) Full of energy;
- (2) Has initiative;
- (3) Confident;
- (4) Polite;
- (5) Diligent;
- (6) Carry out the work on time;
- (7) Healthy;
- (8) Brave in delivering opinion;
- (9) Have a good memory; and
- (10) Resilient.

Based on those contexts, it needs appropriate learning model to be developed by the teacher as an effort to actively develop students' thinking ability, creatively and fun in order to create an innovative mathematics learning, students also can express their mind and feeling optimally. The mind map model can be used in the learning process because it can remember all information easily, creatively, effectively and fun. Buzan (2004: 6) says that mind map is the easiest way to transfer information into the brain, and to obtain information from the brain. This is a creative and effective way of making notes, so it can be said that the Mind Map really mapped your mind. Learning through the mind map model leads students to find ideas from the themes presented and link relationships with each idea. Thus, the students will more easily understand and remember the material that has been explained.

Mind map is the best way to optimize our brain in a simple and easy way because the activities can involve the left brain and right brain as well as learning will be much more fun. According to Windura (2008: 10), mind map uses all the principles of brain management, especially using both the brain actively and synergistically. Through learning by using mind map model, it can show the learning process that demands creativity from the students because it has to create original ideas of each student's thinking and utilize the students' imagination and creativity freely. This shows that the learning process can be fun to be seen, read, grasped and remembered.

Society generally thinks that creativity is innate, something that cannot be learned but it has all been replaced by the human consciousness that everyone is creative. Every human being has the capacity to use their mind and imagination constructively to produce something new. According to Cameron (Johnson, 2010: 213), creativity is a natural creation of life..... ourselves are creations, and in turn, we are destined to pass on creativity by making ourselves creative. So the statement says that every person is creative, depending on our efforts to bring out the creativity that exists within us. Torrance (Silver, 1997) defines creativity as a process to be aware towards problems, weaknesses, knowledge gaps, loss of an element, disharmony, and so on; identify the difficulties; find the solutions, make or formulate hypotheses; and ultimately communicate the results.

Basically, creativity is a person's ability to create something new both in the form of ideas or real work in the form of new works as well as a combination of things that already exist. Creativity gives birth to something that is relatively different from what has been before. Creativity is the result of interaction between individuals and their environment which affect each other. The characteristics of creativity according to Munandar (2004: 71) are:

- 1) Has thorough curiosity
- 2) Asks good questions
- 3) Gives a lot of ideas or suggestions towards a problem
- 4) Expressing opinions bravely
- 5) Have a deep sense of aesthetic
- 6) Excellent in arts
- 7) Being able to see problems from different point of view
- 8) Has a great sense of humour
- 9) Have a great imagination
- 10) Expressing ideas originally.

According to Munandar (2004: 27), developing creativity is closely related to four aspects, there are:

- 1) The personal aspect, creativity arises from a unique personal interaction with the environment.
- 2) The process aspect, creativity is the process of feeling and observing problems, making hypotheses with weaknesses, assessing and testing hypotheses, then changing and testing them and finally delivering the results.
- 3) The product aspect, the creativity product emphasizes that the results of creativity process is something new, authentic, and meaningful.
- 4) The encouragement aspect, creativity in its realization requires an internal encouragement as well as an external encouragement from the environment.

Is there any creativity in Mathematics? Pehkonen (1997) says that creativity is not only found in the art and science, but also found in every part of everyday life. Creativity in mathematics is known as creative thinking. Johnson (2010: 214) says that creative thinking is a habit of the mind that trained by paying attention to intuition, reviving the imagination, expressing new possibilities, seeing great perspectives, and generating unexpected ideas.

Krutetskii (Silver, 1997) defines mathematical creativity is the ability to abandon the habit of solving problems and finding several ways of solving problems in different ways. Meanwhile, Cornish and Wines (Silver, 1997) define mathematical creativity as extending and reorganizing models, changing habits, and being able to predict.

The importance of creativity which is proposed by Bishop (Pehkonen, 1997) that someone needs two mathematical thinking skills: creative thinking in the form of "intuition" and analytic thinking in the form of "logic". Pehkonen (1997) points out the results of his observations which show that the performance of creativity is an important part in mathematics.

Growing mathematical creativity can be done in various ways. It can be through abstraction, connection, and research (Brunkalla, 2009). Abstraction creativity emphasizes the creativity of modelling that reflects the real life and solved by using mathematical science. Connection creativity is the realization of mathematical science that is applied in the form of problems including the problems which are presented in various ways. Connection makes mathematics and other knowledge is understood in order to solve different problems in life. The research creativity is to find out the new mathematical devices that can be used by other mathematical users.

Some experts have developed instruments for measuring mathematical creativity including the Creative Ability Mathematical Test (CAMT) which is developed by Balka and Torrance Test of Creative Thinking (TTCT) which is developed by Torrance. Balka (Silver, 1997) selected six criteria for measuring mathematical creativity from 25 common creativity criteria. The six criteria consist of four divergent aspects and two convergent aspects that determined by mathematics teachers, mathematics educators, and mathematicians. Meanwhile, Torrance (Silver, 1997) developed and validated the Torrance Test of Creative Thinking (TTCT) using the average of four variables: fluency, flexibility, originality, and elaboration.

Mind maps are good registry techniques to help the brain think regularly so it is easier to remember information. A good note-taking method should help students to remember words, readings and improve understanding the material. In line with Buzan's (2004: 6) opinion that mind maps are the easiest way to transfer information into the brain, and to obtain information from the brain. This is a creative and effective way of making notes so it can be said that the Mind Map really mapped your mind.

Mind maps are the best way to optimize our brain in a simple and easy way because the activities involve the left brain and right brain as well as learning will be much more fun. Windura (2008: 10) says that mind maps use all the principles of brain management, especially using both brains actively and synergistically. Further, Windura (2008: 16) says that mind maps are a technical graphic that allows us to explore all of our brain's ability for thinking and learning. Meanwhile, according to Silberman (2009: 188) mind mapping is a creative way for learners to generate ideas to record lessons, or to plan new research.

Through the mind map model, it can help and make students easier to understand and remember clearly and creatively what they have learned. Thus, Mind Map learning is learning by taking note techniques that utilize the entire brain by using visual imagery and other graphical infrastructure to form more interesting impression, therefore students can describe the concept of a material with their own creativity both in terms of language and symbols. Buzan (2004: 14) says that mind map helps you learn, organize, and save as much information as you want, as well as classify the information properly, allowing you instant access to everything you want.

Through mind map learning, students will be easier to find information and a whole description about problems or materials that they are facing, such as read a map. According to

Windura (2008: 19), Mind Map is a map in your brain when you are thinking about something, to be able to find out where your thoughts are going. While Buzan (2010: 5) says that Mind Map is a great route map for memory, enabling us to compile facts and thoughts in such a way so that the natural working of the brain is involved from the beginning. This means remembering information will be easier and more reliable than using traditional recording techniques. Another opinion was revealed by Silberman (2009: 188) that by giving students instruction to create a mind map, they would find it easy to identify clearly and creatively what they had learned and what they were planning.

Mind Map Learning demands students' participation and creativity to produce original ideas of their own. Each student can utilize the imagination and creativity easily and fun. Through the process of recording as well as graphic tools, students can optimally use the ability of their brain to give an interesting and fun impression. The ability of the left brain in writing, writing sequences and relationships between words, and the use of the right brain in expressing colour, image, and dimension (spatial) will produce a work as a form of students' creativity representation.

The steps to create a mind map by Buzan (2010: 15) namely:

- 1) Begin from the centre of the blank paper with the long side laid down. Because starting from the centre gives the brain more flexibility to spread in all directions and to express more freely and naturally.
- 2) Use images or photos for your central idea. Because a picture means a thousand words and helps us to use imagination. A central image will be more interesting, keeping us focused, helping to concentrate, and activating our brains.
- 3) Use colour. Because the brain thinks the colour is as interesting as the picture. Colour makes mind map more alive, give more energy into creative thinking, and also fun.
- 4) Connect the main branches to the central image and connect the branches of two and three levels to levels one and two, and so on. Because the brain works by association. The brain likes to associate with two (or three, four) things at once. When we connect the branches, we will be more easily understand and remember.
- 5) Make a curved line, not a straight line. Because a straight line will make the brain bored.
- 6) Use one keyword for each line. Because a single keyword gives more power and flexibility to the mind map.
- 7) Use images. As if the central image, each picture means a thousand words.

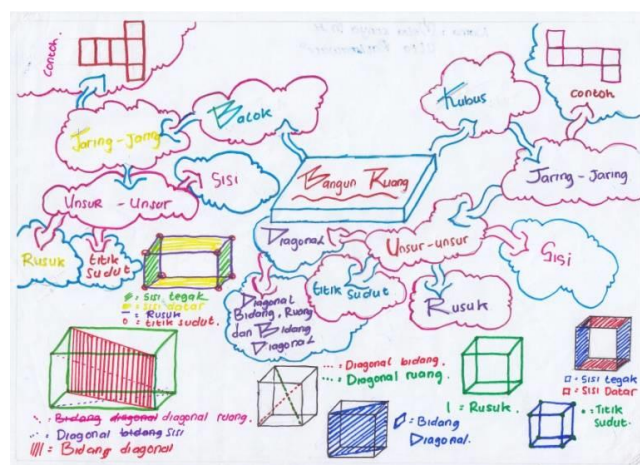


Figure 1. Mind Map of Geometry

### **Advantages and disadvantages of Mind Map**

Through the Mind Map, we can see the whole description of the material we are studying, activating all the brain's work to compose and plan the mind map direction, solve a problem by creating new creative breakthroughs, easier in remembering the information and easier to understand, and get something fun and creative.

According to Buzan (2010: 5) Mind Map can provide a comprehensive view of the main problems, allowing us to plan a route or make choices and know where we are going and where we are, gathering a large amount of data in one place, solving problems by letting us to see some new creative breakthroughs, fun to see, read, grasp, and remember. Meanwhile, according to Windura (2008: 19), the use of Mind Map allows us to see the whole description as well as the problem's detail at the same time. Mind Map keeps strong key words. Through the use of attractive images and colours, the child's right brain becomes more active and immediately balanced with the responsibility of the left brain.

The mind map is a very clear grouping of information, the information that has been grouped will be easy to remember. The mind map also uses a hierarchy between information so that the importance of information is also considered. A lesson that has been structured by hierarchy will be much easier to understand.

Some of many advantages of Mind Map, Windura (2008: 77) reveals the limitations of the Mind Map, there are:

- 1) The beauty of the Mind Map result takes time and a long process.
- 2) To summarize and find a keyword, the main idea in the subject by reading it once or twice (long time).
- 3) Will spend a lot of time in drawing it.
- 4) Students are difficult to determine their main branch in making mind mapping.

Children tend to be afraid to write only keyword they are afraid they only remember that keyword when answered the question in the examination.

### **CONCLUSION**

In order to improve students' mathematical creativity, the use of mind map learning model can be used as one of effective strategy because learning using mind map can give opportunity to students to develop student's learning creativity optimally through the original ideas of each student. Mind Map Learning also utilizes the imagination of students and their creativity freely. In order to make an effective learning process, teachers should make a good preparation in terms of time or preparing the material which will be delivered.

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