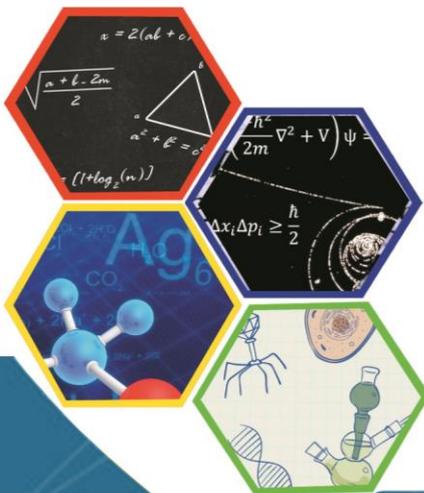
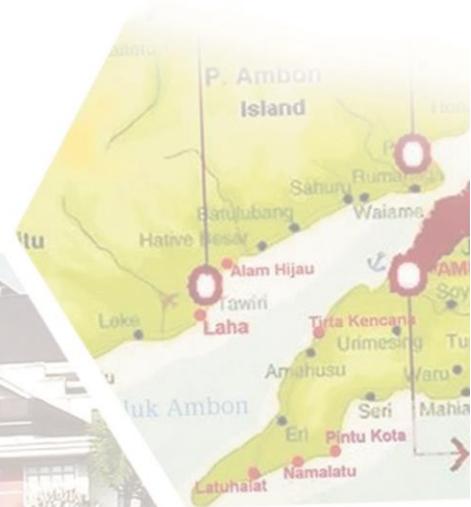




PROCEEDING

The 2nd International Seminar of Basic Science
Natural Science For Exploration The Sea-Island Resources
Ambon, May 31st 2016



Organized by
Faculty of Mathematics and Natural Science
Pattimura University



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The 2nd International Seminar of Basic Science

“Natural Science for Exploration The Sea-Island Resources”

Poka-Ambon, 31st May 2016

**Mathematic and Natural Science Faculty
Universitas Pattimura
Ambon
2016**

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May, 31st 2016

Welcoming Address By The Organizing Committee

Today, We have to thank the The Almighty Allah SWT for the implementation of this international seminar. This is the second seminar about Basic Science in The Faculty of MIPA Pattimura University. The seminar under the title “Natural Sciences for Exploration the Sea-Island Resources” will be carried out on May 31st 2016 at Rectorate Building, Pattimura University. There are 200 participants from lecturers, research institute, students, and also there are 34 papers will be presented.

My special thanks refer to the rector of Pattimura University and the Dean of MIPA Faculty, Prof. Dr. Pieter Kakissina, S.Pd., M.Si. I also would like to express my deepest gratitude to Prof. Amanda Reichelt-Brushett, M.Sc., Ph.D. ; Kazuhiko Ishikawa, Ph.D. ; Nicolas Hubert, Ph.D. ; Prof. Dr. Kirbani Sri Brotopuspito ; Prof. Dr. Marjono, M.Phil. ; Gino V. Limon, M.Sc., Ph.D. as the keynote speakers.

The last, We hope this international seminar usefull for all of us, especially Mollucas People and very sorry if any mistake. Thank you very much.

Dr. La Eddy, M.Si.

Chairman of Organizing Committee

Opening Remarks By Dean of Mathematic and Natural Sciences Faculty

I express my deepest gratitude to The Almighty God for every single blessing He provides us especially in the process of holding the seminar until publishing the proceeding of International Seminar in celebrating the 18th anniversary of MIPA Faculty, Pattimura University. The theme of the anniversary is under the title “Natural Sciences for Exploration the Sea-Island Resources”. The reason of choosing this theme is that Maluku is one of five areas in Techno Park Marine in Indonesia. Furthermore, it is expected that this development can be means where the process of innovation, it is the conversion of science and technology into economic value can be worthwhile for public welfare especially coastal communities.

Having the second big variety of biological resources in the world, Indonesia is rich of its marine flora and fauna. These potential resources can be treated as high value products that demand by international market. Basic science of MIPA plays important role in developing the management of sustainable marine biological resources.

The scientific articles in this proceeding are the results of research and they are analyzed scientifically. It is expected that this proceeding can be valuable information in terms of developing science and technology for public welfare, especially people in Maluku.

My special thanks refer to all researchers and reviewers for your brilliant ideas in completing and publishing this proceeding. I also would like to express my gratefulness to the dies committee-anniversary of MIPA Faculty for your creativity and hard working in finishing this proceeding, God Bless you all.

Prof. Dr. Pieter Kakisina, S.Pd., M.Si.

Dean of Mathematic and Natural Sciences Faculty

ACKNOWLEDGMENT

The following personal and organization are greatfully
acknowledgment for supporting
“The 2nd International Seminar of Basic Science 2016”

Hotel Mutiara Ambon

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LEARNING MATHEMATICS BY INVOLVING THE LEFT AND THE RIGHT BRAINS IN PROCESSING INFORMATION

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ABSTRACT

Learning that involves optimal use of the left and right brain in balance will give positive response to the student in thinking and acting. Therefore the learning should be involves picture, color, dimension, or space to make it easy to understand. The left and right brain does not function independently, but will work together in receiving and process the information. So the teacher is expected can design a learning involving the balance of the left and right brain.

Mathematics as a tool to develop the student's sharpness of thinking can be used in solving the problem that is to think logically, analytically, critically, creatively, and work together. The learning of mathematic will more be fun if there is the balance between left and right brain in processing the information. So the brain emotional learning's system in determining individuality, enable the learning fun for students and make the connection between the left and right hemisphere become faster and the student can think about mathematics' problem solving.

Keywords: Learning Mathematics, The Left and The Right Brain, Processing Information

INTRODUCTION

Mathematics is one of the important subjects of primary and secondary education in Indonesia. That's why mathematic is used as a tool to develop students' thinking sharpness that can be used to solve problems related to daily life. By studying mathematics, student is expected to be able think logically, analytically, critically, creatively and work together (Gaspersz, 2013).

According to Hall (Gaspersz, 2013) that "sitting in limited spaces is one of the most penalties dropped to humans. However, this is often done to the people in the class". Based on this opinion, in learning the teacher always thinks that he knows best mathematical science without thinking that students also have an important role in achieving successful learning. Students used as a place to accommodate science itself. The results make the teacher does not develop students' thinking skills and not paying attention to the fact the importance of the use of the brain the learning process. In fact, with the development of science and technology, it was students who serve as a source of information.

Based on Triune Theory by Paul Mc Clean in 1970 (Safa'at, 2007) that the process of evolution of the three parts of the human brain are big brain (left and right brains), midbrain, and cerebellum with the function of each distinctive and unique. Triune theory is an important finding that should be responded positively by the world of education, particularly in relation

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to developing a brain based learning strategies and empower all potential students. This is because the ability of a person's IQ and EQ can be determined by the performance of the left and right brains. The general trend that occurred in the classroom is learning that only the proper functioning of the cerebellum itself, that learning is a teacher centered. While learning is very important factor in the development and growth as a result of the cumulative learning. In the process of learning the information, to be processed so as to form learning outcomes. The learning process is not unlikely the case with the process of receiving, storing and revisits with information already received. The symptoms of learning can be explained if the learning process is considered as the process of transforming inputs into outputs. So it can be occurred the cognitive process in self learners through the working of the brain.

RESULTS AND DISCUSSION

Mathematics Learning

Learning is defined as an effort to create the condition that allow students to learn. According to Degeng (Mataheru, 2013) study is an attempt to learning students explicitly shown that the existing learning activities to choose, establish and develop a method to achieve the desired results. learning is a process of helping students to build concept / principles with the ability of the students themselves through internalization, so the concepts will be formed. Through this process the transformation of information will be happen because the formation of the student's mind. So, learning is constructing understanding and the build the process is more important than just learning achievement.

Mathematics is a subject requires the concentration to remember and recognize all existing rules and must be fulfill to master the material being studied. Thus, mathematics is one of disciplines that has a big role in supporting science and technology, because mastery mathematics leads students to think rationally critically, systematic, and simplicity. Teaching mathematics involves object of study both direct and indirect. According to Soedjadi, (Mataheru, 2013) the basic object of mathematics are facts, concept, operation, or relationships, and the principles is the object of mental or mind object, then the effort to reactive prior knowledge and thinking patterns is being studied by the students about math, is not the easy one. That's why students are expected to involves active individually in learning.

According to Nikson (Ratumanan, 2004 :3), learning mathematics is an effort to help the students to construct the mathematics concepts or principles by their own ability in the process of internalization, so the concept or it principles can be active again. Thus, learning mathematics can be defined as an effort to learn student on the series of concepts or principles of mathematics that will be built by the student through their experience and capability to help them to think mathematics.

Information Processing Concepts

Every person must receive information in the life captured by the senses. The voice of anchorman that we heard by ear when watch the news can be remembered by us until the next few hours. A part of the news will still remember in our mind details even for several years or decades, but some of the news could be forgotten in short time anyway.

Robert Gagne is one of the leaders of originators of the theory of information processing. This theory believe that learning is the process of getting information, process information, storage information, and recall information controlled by the brain. Learning

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Theory by Gagne (Hidayati, 2012) called Information Processing Learning Theory. This theory is a description or a model of activity in human brain when its process of an information. That's why this theory is called *Information–Processing Model* by Lefrancois or Information Processing model. According to Gagne that learning occur in the process of receiving information, then it will be processed to produce output of outcomes. In the process the interaction of internal and external conditions of individual will happen. The internal condition within the individual is needed to achieve the learning outcomes and the cognitive process that occur to the individual. While, external condition is a stimulation of the environment influence individual in learning process.

According to Gagne (Hidayat, 2012) the stages of learning process includes eight phase, they are :

1. Motivation
2. Understanding
3. Acquisition
4. Storage
5. The memory back
6. Generalization
7. Treatment
8. Feedback

The information will be remembered, first must be come to one's senses. Then, received and transferred from register working memory sense. Then, the process transfer to the long term memory.

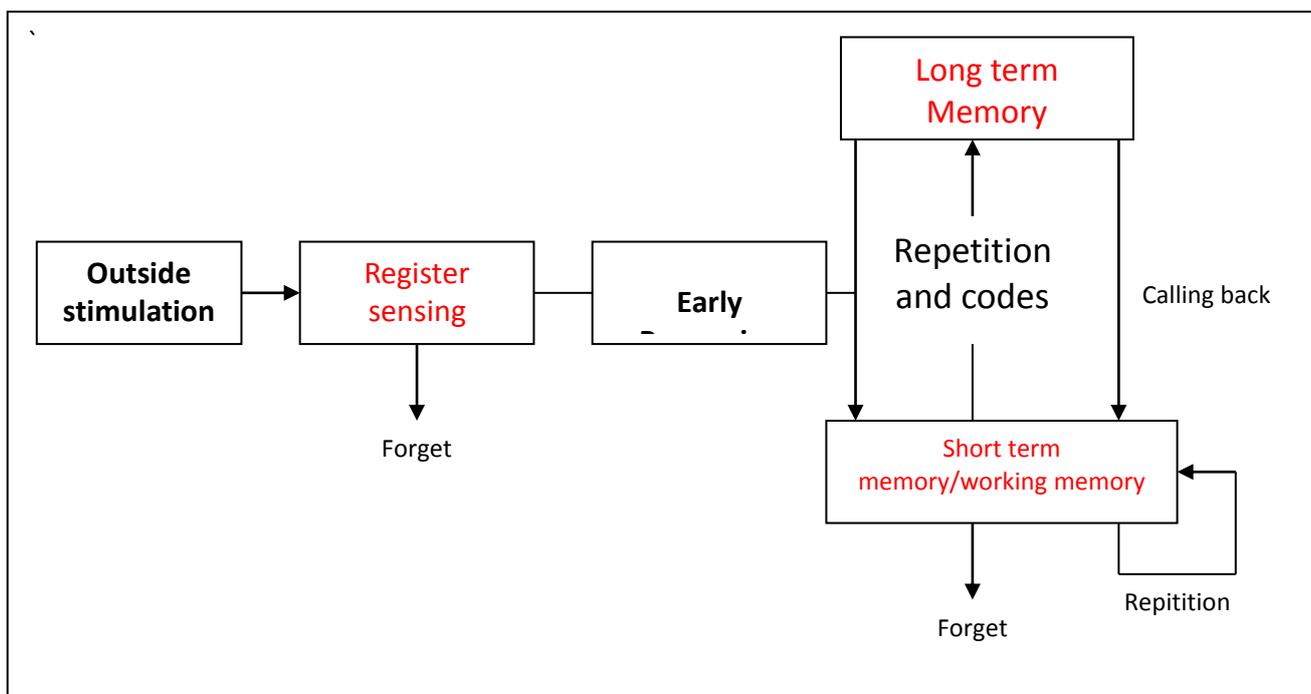


Figure 1. The steps of Information Processing (Slavin, 2009:159)

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The details explanation about the processing sequence information in picture 2.1 is presented by Slavin written (2009:159–163) as follows :

a. Sensing Register

Register of sense receive amount of information from the senses (visionaries, listener, touch, smell, taste) and save it in relative short time, it is not more than two seconds. If there's not something happen in the process of the storage information in the sense of register, the information will lost. Shortly after the stimulus is received by the senses, the brain immediately began working to process the stimulus. Therefore, the image (shadow) sensing that in mind we are not exactly the same as what is seen, heard, or felt; that picture is what is perceived. Perception of the stimulus indirect stimulus reception; perception is influenced by our mental status, past experience, knowledge, motivation, and many other factors. The existence of two registers sensing has important implications for education. First, one must pay attention to the information if the information should be kept in mind. Second, one needs time to bring all the information that is seen (seen) in a short time into the consciousness.

b. Short-term memory

The information is perceived and received the attention of a person is transferred to the second component of the system memory, which is short-term memory. *“Short-term memory is a storage system that can hold a limited amount of information for a few seconds. It is the part of memory in which information that is currently being thought about is stored.”* (Short-term memory is a storage system that can store information in a limited amount in just a few seconds. A short time memory is a part of the memory, this is where information memory current thinking is stored). Thoughts (pikiran-pikiran) we realize at a certain time is stored in our short-term memory. When we stop thinking about something then that something would be missing from our short-term memory. Another term for short-term memory is the working memory. The term is more emphasis on active treatment. Information can be entered into the working memory of the register sensing or from a third basic component of system memory, the long-term memory . Often, both occur at the same time. One way to store information in working memory is to think about the information or say it many times. Process retain an item of information in working memory by exercise is called repetition (rehearsal). Repetition is very important in learning, because the longer an item live information in working memory, the greater the chance piece of information that will be transferred to long-term memory. Without repetition, the possibility that the information item will stay in the working memory of more than about 30 seconds. Because working memory has a limited capacity, the piece of information that can be lost as a result of being pressured by other information.

c. Long term memory.

“Long-term memory is that part of our memory system where we keep information for long periods of time. Long-term memory is thought to be a very large-capacity.” (Long term memory is a part of our system memory where we stored the information for long term . Long-term memory is thought to have a very large capacity. In fact, many experts believe that we never forget the information contained in long-term memory, you probably just lose the ability to recover information stored in our memory. Long-term memory capacity seems to be very large.

Experts divide the long-term memory into three parts, namely episodic memory, semantic memory and procedural memory. Episodic memory is our memory of personal

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experience, an image (shadow) mentally about the things we see or hear. Semantic memory (or declarative) was organized in a very different way. Mentally semantic memory is organized in a network of relationships of ideas related or inter-related and called schemata. Semantics memory contains the facts and its generalizations as we know; concepts, principle, or rules and how to use it, the problem solving skills and strategy of learning. Procedural memory refers to the “ knowing how “ from “knowing that”. Procedural memory is ability to remember how to do something.

The Concept of Brain

An important discovery in the history of the brain is our awareness that the various parts of the brain control different functions. The brain is an important organ in our body because the brain controls our entire body. A healthy brain can support good thinking and the brain of every human being is different, even though identical twins. Therefore, it is important for us to know how our brain works. Each part of the brain has the function and role of each.

According to Buzan (2011: 41-42) The human brain evolved in the following order:

1. The brain stem, controlling functions eg basic life support breathing and heart rate. Controlling the level of preparedness of the incoming sensory information. The brain stem also functions in controlling the temperature and the digestive process and informed of the cerebrum.
2. The cerebellum or little brain, controlling the movement of the body in space and storing memories for basic responses are studied and send vital information through to the brain stem.
3. The limbic system, which is slightly more forward position and consists of the thalamus and basal ganglia (midbrain). The limbic system is important for learning and memory as well as long and short term memory store of life experiences as well as maintain homeostasis in the body (blood pressure, body temperature, and blood sugar levels).
4. The cerebrum (the cerebral cortex), wrap the whole brain and located on the front. The cerebrum is the great work of natural evolution and is responsible for various kerterampilan include memory, communication, decision making, and creativity. The cerebrum is the result of the evolution of the most awesome, the cerebrum is the last part of the brain is developing. Cerebrum is a big part in brain. The ability of intelligent and IQ of a person is determine by the quality of this part. Cerebrum or big brain is divided into two parts the right and the left brains.

The cerebrum is the most important area of the brain that need to be understood in recognizing the power of the brain. Cerebrum or brain divides into two parts: the left brain and right brain. The left brain and the right brain is an important part that regulates the ability of the person. Differences in the left and right brains can shape personality, traits, characteristics and capabilities are unique and different about someone. Big brain is the part of the process all intellectual activities, such as the ability to think, rationale , remember, imagine and plan the future.

According to research professor Roger Sperry and his team as well as professor Robert Ornstein in the 1950s and 1960s, in general, the cerebral cortex (cerebral) divides tasks into two main categories, namely the task of the left brain and right brain tasks.



Figure 2. The function of left and right brain (Buzan, 2011: 48)

Left hemisphere of the brain or what we refer to as the left brain with the ability to rational thinking, logic, ability to write and read, as well as a center of mathematics. According to some education experts, the left brain is the center of the Intelligence Quotient (IQ). While the right brain function in development of the Emotional Quotient (EQ). For example socialization, communication, interaction with other human beings as well as emotional control. On the right brain is also situated the intuitive ability, the ability to feel, blends, and expression of the body, such as singing, dancing, painting and all kinds of creative of other activities . Therefore, we should be able to balance between the left and right brain.

Engaging Learning Mathematics with Left and Right Brains information processing.

According to Arifin, (2009: 46) teaching is an art activity, in addition to the standard competencies a teacher should involve the process of intuition, imagination, expression and improvisation in managing the learning process. In mathematics learning a lot of problems that come in the characteristics of mathematics, medium, or a factor of intellectual development of the student or teacher competence. Furthermore Chi (Arifin, 2009: 79) based on domain, knowledge is awakened in a person is a declarative knowledge, procedural knowledge can also present. Declarative knowledge refers to facts and authenticity. Example; knowledge of the facts in mathematics. While procedural knowledge is knowledge about how to do something. Procedural knowledge can be presented as a set of rules to form pairs between the condition (condition) and action (action). Procedural knowledge are the steps to perform arithmetic operations. Declarative and procedural knowledge can be viewed as an information.

So building a knowledge can be seen as an effort of information processing. In the process of learning mathematics, knowledge of the sigma emblem delivered by teachers with a lecture to students can be absorbed by some students, for some other students such information so fleeting or forgotten. Students who can absorb the information can properly write the sigma emblem complete with understanding. Those that are able to write the sigma emblem without understanding the sense of the sigma. Various possibilities associated with the intelligence of a person on the information received by the five senses kind of thinking, psychology experts associated with the memory.

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One study of psychology is the theory of information processing. This theory examines the relationship between a person's memory and the learning process. It is also highly related to the workings of the brain, which is how someone can function. Left or right brain.

Most of the information we capture just forgotten in a time not too long. The brain will work in synergy and repetition in accordance with their respective functions. Example; when the math teacher to explain a number of terms that refer to parts of a circle, some of the elements of these circles can remember very well, but there are elements of the circle that is easily forgotten.

There are many factors that can affect a person's memory to information which has been received by the five senses. Shortly after the external stimuli captured by the sensory organs, the brain to process stimuli. Overview (shadow) sensory exist in our minds will not be exactly the same as the original. The picture is what is perceived by our sensory organs. The perception of stimuli not the same as our acceptance of the stimulus. This perception is strongly influenced by the mental condition, knowledge, motivation, past experience and other factors. If the teacher by giving an incomplete circle image (cut sections) will be perceived as an image circle intact.

In mathematics learning should be used textbook colorful or a particular letter in presenting the essentials (boldface, italics using a text box or underline). Besides the left brain works processing language (numbers and letters) logic, science and mathematics, at the same time the right brain must work related to the awareness of doing things. According to Buzan (2011: 50) skills owned right brain that daydream is very important for the survival of the brain. Daydreaming provide necessary breaks to the parts of the brain that has been doing the analytical work and repetition, projective and imaginative train of thought, as well as provide an opportunity to integrate and create. Most of the great geniuses use reverie directed to assist in solving problems, generate ideas, and achieve purpose. So how the left brain and right oatak information processing can function in a balanced manner. According Jiwandono (Arifin, 2011: 88) there are three factors that can affect the quality of the memory of the information in the study of mathematics, namely;

1. Elaboration

Elaboration is a thought process by adding the meaning of information by linking the new information to other new information or knowledge that has been previously owned. This relationship occurs when new information is successfully integrated into the framework and included in the cognitive structures or schemata proportionally. This thought process we often experience automatically. When students demonstrate how to calculate long division, they are reminded of ways they read in the book and recalled the steps he did when studying at home.

2. Organization

The organization is a thought process that seeks to organize or arrange items of information so as to form a proper arrangement based on the close relationship between the information. This process is done by considering the results of the elaboration carried out at an earlier stage. Thus, if the information is received by someone already well-organized, of course, this step is not done anymore. The subject matter or teaching materials with a good math organize will be easier to learn and remember by students rather than the mind at random and piecemeal.

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3. Context

Information received will be easy to remember back when we were on the context, the environment, or the same atmosphere as when we receive the information. In mathematics learning, learning activities will be better if the material being studied is associated with a relevant context. Although the relevant context is not in class, but simply imagined it. The relevant context may include examples of real-world object (realistic). When learning about the circle, students' image directed at a circle-shaped objects.

Based on the above three factors, then how mathematics learning process happens so teachers can adjust the mindset of students in receiving the information and process the information received as well as to balance the left and right brain working. If someone has a weakness in a particular area, either the left or right brain and are often trained constantly then the performance will be strengthened.

CONCLUSION

Learning to train one's knowledge and knowledge is built in a person includes knowledge declarative and procedural knowledge. Thus, in the process building a knowledge can be seen as an effort of information processing. Information processing, there are three sequences, is registers sensing, short-term memory and long-term memory.

As information processing, human brain also works evolved with the order of the brain stem, cerebellum (cerebellum), the limbic system (midbrain) and the cerebrum (large brain; left and right brain). The left brain and the right brain is the most important area for left and right brain can control all the memory and learning skills. Left and right brain has the function and operation of each. So one must be able to balance the workings of the left brain and the right brain. This implies that if a person is only functioning one left or right side of the brain then it will be the dominant form habits that prefers activities controlled by the brain and reduces the overall potential of the brain dramatically.

Learning mathematics prefer to the functioning of the workings of the left brain, but one must be able to train the brain so that besides the balance inclination towards mathematics, language, and science in the process simultaneously right brain can function in art, music, and especially the teaching of thinking skills to think creatively.

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