THE EFFECT OF MEMORY MODELS ON STUDENTS' LEARNING ABILITY

Nerru Pranuta Murnaka
Department of Mathematics Education, STKIP Surya, Tangerang, Indonesia
murnaka@gmail.com

Abstract. The purpose of this study was to analyze cognitive memory models in humans. This research uses literature study method. The results and conclusions obtained from this study are that memory is a complex and varied phenomenon, with memory it will make an individual's life feel sustainable, which means humans can relate what happened in the past with the conditions experienced now. Memory has several stages, namely encoding, storage, and recall. With music therapy in post-traumatic amnesia patients the abilities that a person has and do not require conscious processing. The way implicit memory works is by recalling information related to an event or an object that affects actions and thoughts that are carried out unconsciously. Memory itself has several types of models such as sensory memory, short-term memory, long-term memory, implicit memory, explicit memory, and flashbulb memory. With learning about various memory models, it is hoped that individuals will understand more and increase knowledge about memory and remembering.

Keywords: memory model, memory, cognitive, remembering, mnemonic method.

Introduction

Neisser (2002: 65) explains that the term cognitive comes from the word cognition, which means knowing or knowing, which in a broad sense means the acquisition, arrangement and use of knowledge. According to Mayers (Desmita, 2010) cognitive is the ability to imagine and describe objects or events in memory. Piaget (Syah, 2002) says that cognitive performance is the result of improvements from the previous stage of attitude development.

Then, memory is a complex and varied phenomenon. Opinions from several educational psychologists explain how information can be stored and encoded for later re-disclosure based on a specific purpose. The theory of memory reveals that memory is not only a storage system for what information we get, but also a memorable event from ourselves that can be influenced by other people or through future events. In addition, memory can also be interpreted as a function of cognition that involves the brain in the process of retrieval of information.

Another understanding of memory according to Suharnan (2005) explains that memory or commonly called memory is the storage of knowledge in the human mind system, which lasts from a few seconds to the entire human life. Understanding memory according to Solso, Maclin & Maclin (2007) also explains that memory is a process that involves a large number of brain areas and also areas that have more dominant functions than others. Meanwhile, according to Atkinson (2000), memory is an element of cognitive development that contains all situations in which it stores information received by individuals over time. So, based on the explanation above, memory
is a process that becomes a storage place for the contents of the human mind which involves a large number of brain areas and functions of the dominant areas.

Many things in human life involve memory cognition in everyday life. With memory will make the individual's life feels sustainable. That is, humans can relate what happened in the past with the conditions experienced today. So without us realizing it, many things humans do involve processes related to memory. Therefore, memory is part of a historical process where it is not determined by the influence of the process from things that are happening at the present time, but develops in the history of the past that it still has and can be revived at any time. Several stages of memory are encoding (encoding), storage (storage), and recall (retrival). Coding is the absorption or recording of information obtained through the five human senses. In coding humans absorb information through their five senses like hearing information from someone. Then storage is the process of how long information lasts and continues to be embedded in individuals. Information storage can be active or passive. While recalling is remembering or repressing memories that have been collected when finding an event or condition familiar to the individual.

**Types of Memory**

Several types of memory models according to Atkinson and Shiffrin (2020) include sensory memory, short term memory (STM), and long term memory (LTM), implicit (procedural) memory, explicit (declarative) memory, and flashbulb memory.

1. Sensory Memory
Sensory memory is a temporary information storage process from the five human senses. This storage process is also a storage process through sensory nerves in a very short period of time within 4 seconds. So it can be said that sensory memory is obtained from what individuals do everyday, such as when we hear information from people around us who are chatting. After we leave from there we may forget because we only casually hear the information.

2. Short Term Memory (STM)

Short term memory or so-called short-term memory is a memory storage process that is temporary and the information can last in the short term as long as the individual still needs the information. STM will take place when humans can focus their thoughts and attention on an object, but if they are distracted it can cause forgetting. STM only lasts for 12-30 seconds with 5-9 information that can be remembered, so if it is not repeated or recorded it will make the information disappear from the individual’s memory. This kind of forgetfulness often occurs when the individual has to remember something for a short period of time. For example, we are memorizing material given by the lecturer. After 30 minutes of memorizing, we try to re-explain the material we read. Here, it will be seen whether the short-term memory of the kit works well or only some memories come in and the rest are easily forgotten. One characteristic of short-term memory has been discussed in the Atkinson-Shiffrin (1968) model, namely that material is lost within 30 seconds if it is not repeated.

3. Long Term Memory (LTM)

Long term memory is a process of storing information that is relatively permanent and can last for a long period of time. Memories that go into this LTM are usually hard to forget for a lifetime. However, this long-term memory can be lost if the individual experiences damage to brain function, such as due to impact during an accident, falling from a height, amnesia.

4. Implicit Memory (procedural)

Implicit memory is memory by doing something, such as how to comb, use a pencil, and so on. Implicit memory is also an ability that a person has and does not require conscious processing. The way implicit memory works is by recalling information related to an event or an object that affects actions and thoughts that are carried out unconsciously. Implicit memory measures an individual’s ability to perform a task or do something. Implicit memory will show the influence of past experiences which are gradually controlled in our behavior habits when attempts to recall things that have been difficult to appear in consciousness (Roediger, 1991).

5. Explicit Memory (declarative)
Explicit memory is a method of consciously recalling information related to an event or an object. For example, when an individual wants to tell his past to others, he does so by consciously recalling past information in his memory.

Measurement of explicit memory will measure the level of an individual’s ability to remember information. In general, explicit memory is measured through recall by requiring the individual to recall the items that have been learned immediately, or through recognition where participants must identify the items in the proposed list based on the lists whose schema has been studied.

6. Flashbulb Memory

This type of flashbulb memory is a form of memory in situations where a person for the first time tries to remember something that is memorable and touches the individual’s feelings.

Memory Working Mechanism

Barrett, Tugade, and Engle (2004) demonstrated that the construct of working memory capacity is similar to the function of the central executive component in Baddeley’s working memory model (Baddeley & Hitch, 1974). Working memory capacity is measured by various task ranges. The ranged tasks discussed below test people’s ability to focus on two tasks at the same time.

There are several kinds of working memory mechanisms, namely Disuse Theory, Inference Theory and Information Processing Theory. Aus Theory (Disuse Theory) explains that memory disappears over time if it is never honed or developed. So there is a need for repetition and recall so that the memory in the individual does not fade quickly. Then the Inference Theory explains that memory is like a canvas while experience is a painting or work on the canvas. When the individual has created the painting that he wants to display, it is like when the individual has received the information. So the information obtained must be immediately entered into long-term memory so that it is not easily forgotten. In Inference Theory is influenced by retroactive inhibition (backward inhibition) and proactive inhibition (forward inhibition). Meanwhile, the Information Processing Theory explains that information processing is an active process that involves input from phenomena/symptoms in reality, memory processes or remembering, perception and thinking. So the processing of information is not only to accommodate what information is obtained but also to process the results of the information obtained whether an information will be removed, added, or changed.
Cognitive Psychology Perspectives About Memory Working Mechanisms.

According to the perspective of cognitive psychology, memory is the power of data as well as a form of memory that functions to receive, store and reproduce what has been obtained by the individual. With memory, humans can store information, memories or events that have been passed which are also included in long-term memory. However, the information that enters long-term memory is not entirely still stored in the human brain. Many events such as in the past are often stored in memory, especially events that are deeply imprinted on a person. There are several factors that can affect our memory, namely physical condition and also due to other factors.

On the factor of a person's physical condition caused by fatigue, illness, lack of sleep. Some of these things can cause human memory to decline and also make it difficult for individuals to remember for long periods of time. In addition, other factors are due to the age factor in the elderly (60 years and over). At this age memory will slowly decline and memory processing begins to fade little by little. Thus, it is necessary to maintain good memory from a young age so as not to experience memory damage. Further caused by other factors. For example, such as emotions, the pressure of events that shake the mind, the response someone receives to us. In these cases, when a person experiences strong emotional stress, the person tends to remember the event. Meanwhile, memories or events that do not touch emotions will be ignored.

In addition, the information processing stage also starts from seeing how the stimulation from the first (external) environment enters the sensory memory. This sensory memory has a large capacity in storing systems that accurately record information from each sensory device. From the sensory memory then information flows into Short Term Memory (STM) which consists of only a small part of the information that is actively used. Next proceed to Long Term Memory (LTM) or what we often do. In the process of storing memory into the LTM, we can use several methods, namely rehearsal (repeating information) and retrieval (remembering to see how stimulation from the (external) environment first enters the sensory memory. Sensory memory
has a large capacity in storing systems that record information from each memory. -each sensory device accurately.

**Memory Model Research Method**

According to Abu Ahmadi’s view, there are 6 general memory research methods including:

1. **Learning Method (The Learning Method)**
   
   Is a method of investigating the ability of individual memory by seeing how far it takes a person to master the material given without errors. For example, someone gets an order to study material about the language given by his teacher. There are people who are fast in remembering what is learned, but there are also people who are slow in absorbing information. Each individual has a different grasping and reasoning power so that from here it can be measured his memory ability.

2. **Relearning Method**
   
   Is a method in which individuals have to re-learn the material or information obtained based on time and certain criteria. The more often the individual learns and repeats the material, the shorter the time to remember it takes. That is, the more effective a person’s time in storing information or material obtained from the repetition of information. Because part of the information or material is really remembered by the individual so as not to be easily forgotten.

3. **Reconstruction Method**
   
   Is a method in which individuals reconstruct the material or information obtained. For example, when individuals are shown a neatly arranged puzzle. Then the puzzle is disassembled and the individual must rearrange the arrangement so that it can return to a complete puzzle form. From here it will be seen how long it takes individuals to carry out the reconstruction process in compiling the puzzle, whether it is faster or slower.

4. **Recognition Method.**
   
   Is a method that serves to introduce individuals to the information or material presented. From here, the material studied by the individual will be tested into a test in the form of multiple choice or true-false choice in order to find out how much memory capacity the individual has.

5. **Recall Method.**
   
   Is a method by which individuals recall what has been received and learned which is then poured into an essay in the form of an exam. So, from how to answer the individual, it will be seen how far the remembering process is carried out by the individual. Have you remembered what you have learned well or can you only remember part of it?

Is a method that is carried out by means of individuals having to study the material in pairs. Here it is used to determine the extent of a person’s ability to remember when discussing each other with their respective learning partners. If the material has been studied, when the test is carried out, one of the partners is used as a stimulus and the individual provides the information he remembers to his partner. This can form memories again.

From the six descriptions of memory research methods, it can be concluded that the memory process includes three important points, namely firstly imparting information in the form of syllables, words, terms, concepts, and everyday experiences. The second is to store impressions and messages from the information received or obtained, and the third is to reproduce the contents of memories so that individuals do not easily forget the information obtained.

So, it can be concluded that from the perspective of cognitive psychology there are 6 methods in memory models that can help individuals in the work process to reproduce the memories collected.

The emergence of a memory

Some things that can make a memory arise are:

1. Memories of something like the name of the prettiest person in a class. Here, what you want to reproduce is only part of the memory. This is also done at the time of the exam using the essay method or providing a definition.

2. Recollection, namely recalling a past event completely, as done by an accused who answered all questions from the judge for all his behavior in the crime he had committed.

3. Recognition, i.e. re-recognizing a thing, object or person after some of it is seen or heard again, such as seeing a child remembering his father; because the child is exactly like his father. The use of the method of choosing (multiple choice and or true and false) is the use of recognition.

4. Re-learning something to show that there is a residual memory that remains even after a long time something was learned. Ernest R Hilgard relates that an American one year old was read daily 21 specific lines of three Greek books for three months. At the end of the three months, another 21 lines from three other selected yinani books were read. After three months, another 21 lines were read and so on while the child was not taught or told to learn Greek at all. At the age of 8, 14 and 19 years, it was investigated what was left in the child's memory. The child was told to memorize the Greek lines he had read to him
before, along with other new lines which were roughly the same. In general, an 8-year-old child only needs 30% of the time to repeat lines that have been read to him before compared to the time for lines he has never heard. At the age of 14 years only 8% less time to repeat lines that have been heard to him before compared to time to learn lines that are new to him. At the age of 18 there was nothing left of the lines that had been read to him before. So it is evident that there are remnants of memory from material that was only read at a very young age, after five years.

5. Exploring memory span awareness. This experiment is somewhat different from the results of experiments conducted by Ebbinghaus on the residual memory of something that has been learned. This result is expressed in a curve (Ebbinghaus) which shows what percentage of something that has been memorized can still be remembered. The experiment turned out to be different if the experiment was carried out by the experimental person in a conscious state or after sleep between the time of memorizing it and the time of recalling it. Closer to this problem is memory span, that is, the number of objects that can be seen at a glance to remember. Most people can still remember a phone number consisting of five digits, but more than nine digits cannot be recalled. If a phone number consists of seven digits people can still remember it 50% of the time it is shown. These seven numbers are called memory spans.

From the five points above, according to Matlin (1993) there are several things that individuals need to do to improve learning strategies more effectively, including knowing what work strategy is more appropriate, how long it takes to study before attention is divided, spending a lot of time to study, when there is free time, knowing the strengths and limitations of memory, how individuals manage memory and related processes knowing the plan of study activities, how to manage attention, how to monitor the comprehension of the material being read, and knowing where to give extra time and attention.

**method**

The research method used in this journal uses the literature study method. Literature study is a series of activities related to the methods of collecting library data, reading and taking notes, and managing research materials. According to Danial and Warsiah Literature Study is a research conducted by researchers by collecting a number of books, magazines related to the problem and research objectives. This technique is carried out with the aim of revealing various theories that are relevant to the problems being faced/researched as reference material in the discussion of research results.
Data collection techniques use literature, and integrate and present data (Danandjaja, 2014). In this study, researchers prioritize research articles published in journals within the last 1 year. The article that is used as a source in this research is related to the analysis of human memory models that affect the cognitive perspective in humans. In this study, researchers also used references from cognitive psychology journals with the theme of memory models. Journal references used by researchers are journals of 5 years and over, thesis references related to the research theme, as well as from several recent web pages. The journals used are journals that are still related to the memory process and at the same time discuss cognitive psychology.

Results and Discussion

In this study, we want to examine the various models of memory and their influence on learning at the student level through cases of learning development in the cognitive domain that we have looked for in various journals and other sources. So, we as researchers also use references from several journal sources as a result of research and discussion of cases about cognitive in students. We do this so that we understand that we do not only know about memory models but can also be seen directly from real case examples from the references we have looked for and summarized.

In the results of research from journals that have been searched on "The Effect of Mnemonic Methods on Mathematical Reasoning Ability and Memory" it can be explained that the mathematical reasoning ability of students whose learning uses the mnemonic method is obtained from the results of the mathematical reasoning ability test conducted at the seventh meeting. In determining the value of the mathematical reasoning ability test, it is carried out in accordance with the scoring guidelines for the mathematical reasoning ability test with a maximum score of 16 and the minimum completeness score (KKM) is 78 or equivalent to 12. The mnemonic method is said to be effective if the results of the student's mathematical reasoning ability test are more than 75 % reached the minimum completeness score (KKM). To find out the average percentage of mathematical reasoning ability test questions for each question and indicator, calculations are carried out so that data is obtained as presented in order to achieve KKM, you must carry out remedial measures.

Table 1
Educational Data with Mnemonic Method

<table>
<thead>
<tr>
<th>Value Interval</th>
<th>Frequency</th>
<th>Score (%)</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 103</td>
<td>7</td>
<td>18.92</td>
<td>Student Memory is Not High.</td>
</tr>
<tr>
<td>104 - 120</td>
<td>30</td>
<td>81.08</td>
<td>High Student Memory</td>
</tr>
<tr>
<td>Amount</td>
<td>37</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
Based on the data, it can be seen that from 37 students, as many as 30 students reached the high memory category and as many as 7 students did not reach the high memory category. Then the results of the data obtained indicate that the mnemonic method is effective on the mathematical reasoning ability and memory of students as evidenced by the results of the students' reasoning ability test reaching > 75% > 75% achieving complete learning or KKM (Maximum Provision Criteria) and the calculation of the participant's memory questionnaire. Students achieve > 75% > 75% have high memory category.

So the researchers concluded that learning by using the mnemonic method was effective on the ability of mathematical reasoning and memory of students. Therefore, students are required to first design a mathematical model then students manipulate or manage (do) in the right way. While the indicators draw logical conclusions to get the highest average of 3.51 if the percentage is equal to 87.75%. Because in the process, students are required to read the data in a table and then give logical conclusions after reading the data. This can be seen when carrying out learning students are able to read data in the form of tables or in the form of diagrams. The causes of the effective mnemonic method on the mathematical reasoning ability and memory of students are first, creating active learning. This can be seen from the responses of students when learning takes place, they are very enthusiastic about following the learning steps. By working on LKPD containing problems in groups, students are able to find statistical concepts correctly. In learning, students not only get an explanation from the teacher, but are also guided to use various learning resources to find concepts, learn them, and understand them.

This is in line with further research data from the journal "Working Memory Capacity (KMK) in Mathematical Problem Solving". In this journal, this study describes how working memory affects a person's ability to solve problems (especially in mathematics). In this journal the solution offered has several steps, namely starting from the solution phase, activation, and investigation. Meanwhile, in the journal "Mnemonic Methods on Mathematical Reasoning and Memory Ability" the solution to the problem solving is only data from test questions and students' academic ability scores. However, there are also stages in which the mnemonic method is effective on students' mathematical reasoning abilities, namely by being guided in stages and given abbreviations about a material or formula so that learning becomes fun and entertaining for students.

Meanwhile, the advantages of this journal are that the research studies listed are sought and also linked to theories from several sources or references to show the interrelationships between the research results that have been achieved and the theoretical guidelines used. Meanwhile, from this journal, what the researchers wrote only conveyed the results of the
research found in detail that explained how students after being given the mnemonic method of students' memory became better, this could be seen from the attention, understanding, confidence, activity, interest and perseverance of the participants. students in learning mathematics. The memory of students is in the high category because students are accustomed to underlining the material to remember the material that has been studied, then abbreviations and keywords are given to a formula or concept so that students are able to remember and the memory of students is getting trained. However, in subsequent journals, the memory problem-solving process was only associated with the analysis of previous researchers. For example, Hitch's Analysis which shows that mental arithmetic requires the temporary storage of initial information and partial results includes sections relating to operations. This provides a theoretical basis that explains that the execution of the computational processes underlying mental arithmetic depends on working memory. Weaknesses in the journal that the researcher writes and the other journal is the journal "Working Memory Capacity (KMK) in Solving Mathematical Problems" which does not describe the details of the research results achieved from real examples, and this journal has a drawback, namely the lack of theory associated with the results of the research. But the two journals both have different problems but are still in one unified problem solving about memory and cognitive.

Below are references from several journals that researchers have taken that are used as comparisons and also input on the research that we have done, some of the journals we have been looking for include:

Relationship between working memory capacity and mathematical problem solving. Following is a diagram of the problem solving process related to information processing, there are two stages, namely the representation phase and the solution phase (Newell & Simon, 1972).

![Diagram of Problem Solving Process](image)
The representation phase is important as a basis for finding solutions by identifying 1) the information provided, 2) the objectives related to the problem, 3) the importance of elements in the problem statement such as operators, symbols, or diagrams that are often used in mathematics, and 4) possible constraints that may arise. Effect on the solution space. There are a number of processes that are taken by problem solvers in developing a problem representation by interpreting the proposed problem statement. In the solution phase, the problem solver uses the problem representation to activate long-term memory (LTM) elements in the search for possible solutions in the solution space. This allows searching for relevant problem solving schemes, algorithms, strategies, or candidate solutions.

Based on the explanation above, in the representation phase and the solution phase in the problem solving process, there are processes that involve working memory capacity, namely information storage, information processing, or information retrieval. Someone with a high working memory capacity will be more helpful in the problem solving process, this is supported by the statement (Willey & Jaroz, 2012) that working memory capacity can generally support more effective problem solving in a similar way to expertise. Working memory capacity (WMC) can increase the functional capacity of direct memory storage and can enable the retrieval and use of domain-relevant information. Working memory capacity can help narrow the search space for the right solution. One of the studies on the relationship between working memory and mathematical problem solving was conducted by (Hitch, 1978).

Meanwhile there is an investigation from the other side on the relationship between working memory capacity and mathematical problem solving, namely the exact process or skill underlying mathematical problem solving depends on working memory capacity (Gathercole & Pickering, 2000; Holmes & Adams, 2006). Based on the research reviewed, there are several processes involved in solving mathematical problems that show problem solvers are influenced by working memory capacity, namely skills in executing sequences and retaining partial results, efficient retrieval of facts and mathematical knowledge of structures such as problem schemas, and successful transformation of problem representations. (Geary & Widaman, 1992) showed that working memory capacity specifically predicts the success of problem solving involving carry operations. Middle school children are better at solving word problems that have been demonstrated, namely children who have higher working memory capacity than other children with low working memory capacity (Dark & Benbow, 1990). A number of other studies have supported that working memory capacity is related to problem solving, especially mathematical problems (Passolunghi & Siegel, 2004). In the problem-solving process, working memory capacity
appears to assist with interpreting problem statements, withstanding distractions from irrelevant problem information, and with transforming problem representations.

So the conclusions from several findings from the mathematical problem solving literature support that working memory capacity helps in information storage and processing. Working memory capacity is very helpful when solving problems, in this case an example is a multistep math problem such as an arithmetic problem. In simple arithmetic problems, a problem solver with a high working memory capacity can show differences from a problem solver with a low working memory capacity. Sources of these differences indicate superiority in coding or retrieval of mathematical facts or knowledge structures in long-term memory (LTM), ability to deal with distractions from relevant and irrelevant information, ability to focus on problems, and ability to generate or manipulate mental problem representations.

This literature study research examines relevant theories and problem solving to discuss how KMK can help someone when trying to solve problems, especially math problems. The method used is data collection through literature study. The data obtained were compiled, analyzed in depth and concluded. The results showed that KMK played a role in maintaining and retrieving information in LTM. KMK can have an impact on the success of solving mathematical problems by supporting more effective problem solving by enabling the retrieval and use of information relevant to the domain. KMK helps narrow the search space for the right solution and can help problem solvers to focus on problems and experience less distraction from irrelevant information.

This journal also describes the process of solving problems related to information, namely the representation phase is important as a basis for finding solutions by identifying. There are a number of processes that are taken by problem solvers in developing representations, namely by interpreting the statement of the problem posed. In the solution phase, the problem solver uses the problem representation to activate the long-term memory (LTM) element in the search for possible solutions in the solution space. This allows searching for relevant problem solving schemes, algorithms, strategies, or candidate solutions.

While the journal entitled "Improving Early Grade Students’ Learning Attention Through Visual Media" aims to find solutions related to efforts to increase student attention, especially at the initial level, namely 1, 2, and 3 on learning tasks during the learning process that uses visual learning media. This study uses an integrative literature review method. This method connects several empirically based articles and visual media research in increasing the learning attention of early grade students.
explained that based on several searches that have been carried out, obtained from existing studies that explain increasing student attention, especially at the initial level, namely grades 1, 2 and 3 on their learning tasks during the learning process using visual learning media. Attention is clearly and subjectively experienced by all healthy people who are aware, alert, and capable of at least some degree of introspection (Cohen, 2014). This study examines issues related to efforts to increase the attention of elementary school students, especially the early grades to their learning tasks during the learning process. The study focused on the use of media. The results of this study indicate that First, attention is a process of selecting information that is controlled voluntarily by the subject (conscious), or can be due to the influence of some external event that is captured by the senses (unconscious). Second, the process of attention occurs through selection, awareness, and control. The use of learning media, especially media that emphasize the use of the sense of sight or visuals, has an influence on students’ attention in learning which ultimately leads to better learning outcomes. Third, the visual media model used should be varied, both learning media made by the teacher himself and media taken from the internet. Visual media in the form of infographics is the most recommended visual media model. Fourth, the implications of the function of visual media on sensory memory.

Relation to the Journal "Increasing the learning attention of early grade students through visual media"

Based on the search that has been done, it is obtained from existing studies that explain increasing student attention, especially at the early level, namely grades 1, 2 and 3 to their learning tasks during the learning process using visual learning media. Attention is clearly and subjectively experienced by all healthy people who are aware, alert, and capable of at least some degree of introspection (Cohen, 2014). Every day we are bombarded by a number of information both in print media such as newspapers, magazines, tabloids and others, as well as electronic media such as television, social media, and others. All of this grabs our attention. In the office or at work, we are given various tasks that demand our attention. At school the students are asked to follow the learning process with various instructions and information from the teacher that must be their attention. When teachers carry out learning tasks both inside and outside the classroom, teachers are often faced with the problem that there are even relatively many students who lack attention to the explanations, instructions, and information they convey (Purwatinininghandayani, Wahyuni, & Azis, 2019). Many students tend to be preoccupied with their own activities. Students tend to be more interested in other things that are received by their senses so that they grab their attention. In today’s digital era, almost all students in both early and high grades bring
smartphones to school. The presence of smartphones adds to the complexity of problems related to student attention in the learning process. Even though teachers and even schools forbid students from opening smartphones during the learning process, many of them do not heed the prohibition. This situation is of course not good enough to support an effective learning process. If the teacher is not able to control the attention of his students, then the learning process will certainly fail to achieve the goal.

This study examines issues related to efforts to increase the attention of elementary school students, especially the early grades to their learning tasks during the learning process. The study focused on the use of visual learning media to increase students' attention in learning. The problems discussed in this article are formulated as follows:

1. What is meant by attention
2. How is the role of visual media in information processing to increase the attention of early childhood students towards their learning tasks.
3. What visual media model can guide, direct, and focus the attention of early childhood students on their learning tasks?
4. What are the implications of sensory memory through visual media on increasing the attention of early childhood students in the learning process.

This research is a literature study using an integrative literature review method. Using this method, a literature review is carried out through the process of analyzing, critiquing, and synthesizing a number of representative literature on topics relevant to the problem in an integrated manner so that new frameworks and perspectives are generated (Callahan, 2010). Therefore, in late adolescence, all the potential possessed by children needs to be encouraged so that they will develop optimally. This method combines various empirically based research articles, books, and other literature that are relevant to the problem being studied.

The search results of various references found that there was no agreed definition of attention. However, most researchers refer to attention as a series of processes that enable and guide the selection of incoming perceptual information. Cognitive psychological theories view attention as a series of processes that enable and guide the selection of incoming perceptual information to limit external stimuli processed by the cognitive system, limited so as not to overdo it. Human perceptual and cognitive abilities are a finite resource. Attention is the mechanism used to allocate those resources in the most effective way. Attention can be controlled voluntarily by the subject, or it can be captured by some external event. Attention characterization highlights many important elements, namely:
1. People usually report that their object of focus is at the forefront of their consciousness when they are present.
2. The object or information on which attention is focused usually becomes clearer and clearer than any other possible object or thought.
3. This process involves selecting one from a variety of possible stimuli or thoughts at any given moment.
4. When attention is highly focused, other unrelated stimuli are out of consciousness and remain until there is a release from the main focus of attention (Cohen, 2014: 303).

Media is an intermediary or delivery of messages from the sender to the recipient of the message. In general, visual media are grouped into representational image media (pictures and photos), diagrams showing the relationship between concepts and material content, maps showing the relationship between elements in material content, and graphics (Jatmika, 2015). Learning media can be classified based on the technique used in making the media, the method used to send the message, the form of information used, or the level of concreteness and abstraction such as classification according to Edgar Dale. If classified based on the form of information used, learning media can be classified into the categories of silent visual media, motion visual media, audio media, silent audio-visual media, and motion audio-visual media. Schmidt & Vandewater (2008) explained that based on the results of Gavriel Salomon's research, various forms of learning media present and develop different cognitive processes. Repeated exposure to cinematic codes presented in films, such as zooming techniques, leads children to internalize these codes and improve their learning outcomes. A number of studies have found benefits of video games for visual attention, including greater attention capacity, faster attention spread, and faster processing. One of the growing concerns is whether electronic media use is associated with attention deficit hyperactivity disorder (ADHD) (Schmidt & Vandewater, 2008).

In learning activities, lecturers and students interact with each other and in two-way communication. Lecturers act as messengers delivering messages in the form of teaching materials, assignments, exercises, or others by utilizing certain media to students as message recipients. Interactive visual learning media are used, among others, to avoid verbal communication. The weakness of this form of verbal communication is that it is strongly influenced by the giver of information, the recipient of the information, and the environment in which the communication takes place. The message conveyed by the teacher is in the form of communication symbols (encoding) which will be translated by students into a message (decoding). Sensory memory is the first component that receives information in the information.
processing system in the memory structure of the human brain. To provide the perception and initial identification of the information received, this memory converts the information in the form of stimulus signals. The results showed that this memory retains these signals to provide perception and identification in a very short time (less than one micro second) and these signals will soon disappear from this memory due to the arrival of stimulus signals. The implications of this sensing memory function on the learning process include:

1. Sensory memory can only process a limited amount of information, so the presentation of learning materials needs to be designed so that key information can be well received by students. Sensory memory receives information from the five senses, so that combining the presentation of information, for example, visual (written) and verbal, can increase the amount of information that can be received by the sensory memory. Resulted in four conclusions: First, attention is the process of selecting information that is controlled voluntarily by the subject (conscious), or can be due to the influence of some external event that is perceived by the senses (unconscious).

2. Second, the process of attention occurs through selection, awareness, and control. The use of learning media, especially media that emphasize the use of the sense of sight or visuals, has an influence on students' attention in learning which ultimately leads to better learning outcomes.

3. Third, the visual media model used should be varied, both learning media made by the teacher himself and media taken from the internet. Visual media in the form of infographics is the most recommended visual media model.

4. Fourth, the implications of the function of visual media on sensory memory include: (1) sensory memory can only process a limited amount of information, so that the visual media used to present learning materials need to be designed so that key information can be well received by students; (2) the sensory memory can receive information from the five senses but the highest absorption is the sense of sight, so that combining visual information presentation can increase the amount of information that can be received by the sensory memory.

The implications of this sensing memory are also supported by many things. One of them is the management of learning resources using cognitive maps in order to foster students to form cognitive competencies of knowing, understanding, applying, analyzing, evaluating, and creating (Gage, Ing, & David, nd). The cognitive map is also a consideration in managing lecture material (in this case child development material) through the implementation of blended learning.
lectures. As we know, blended learning is learning that combines the best aspects of online learning, with face-to-face activity patterns, and with real practice. So, the basic concept of cognitive development is designed for the cognitive level of understanding and application is carried out *face to face*, followed by online application. When online, students apply the basic concepts of individual development, as well as *searching* for unlimited learning resources for analysis and evaluation of material aspects of individual development. Finally, each material aspect of individual development is reflected on the lecture material on-line to provide an opportunity to develop an evaluation cognitive map. The final product of the lecture is geared towards cognitive maps creating developmental interventions.

So, by doing visual media-based learning on this blended learning system, it is hoped that it can help students apply cognitive maps of each individual so that students can capture and apply what they have learned into real life. In addition, students become more aware of the extent of their STM and LTM memory levels. Did the lecturer just memorize it for a while then the lecturer asked that the student had immediately forgotten or the student would record what the lecturer said then when asked he could answer well because he used his LTM memory well. All of these things are determined by the individual himself whether he will continue to sharpen and hone his memory so that it gets better through various memory models or just casually and forgets so on. Then, the implementation of lectures carried out through blended learning provides the opportunity for lecture participants to innovate widely, especially the opportunity to develop a cognitive map at the functional level of the nature of the course in the basic position of graduate competence. However, building a cognitive map of college participants is trial and error. The nature of the cognitive map is broken down into three, firstly motivational factors, secondly the level of learning factors that tend to focus on end-of-college events, and the third factors tend to choose erratically due to loss of interest, boredom, or fatigue (Yechiam, Busemeyer, Stout, & Bechara, 2007). In addition, the benefits that have been obtained through the implementation of blended learning have also been recognized, including the benefits of improving communication skills among students (Hess et al., 2016); learning innovation (Marrinan et al., 2015), then also increasing collaboration and mutual discussion among students (Eppich, 2015) (The Yanto H. & Alawiyah S., 2019); student satisfaction to explore the material more broadly (Sajid et al., 2016); and strengthen students' perceptions of lecture material (Dziuban et al., 2018). In addition, there are several obstacles in the case of certain students, including not being independent in learning and compiling cognitive maps by accessing on-line due to the many challenges that must be faced (Gros et al., 2016); including very complex *adaptive systems* (Wang, Han, & Yang, 2015).
Improved cognitive maps in memory models that vary in student participants depending on the interests or interests of students to utilize the substance of the lecture to the competencies to be achieved or the final project to be prepared. This condition also strengthens students' perceptions of lecture material but is individual (Dziuban et al., 2018). In addition, there are several obstacles that exist in the case of certain students, including not being independent in learning and compiling cognitive maps by accessing on-line due to the many challenges that must be faced (Gros et al., 2016), as well as the lack of student knowledge about types of models. A memory model that can be used to help the learning process so that it is easier for students and students become more aware to provide solutions to themselves in which areas of memory need to be improved for the better.

According to Benjamin S. Bloom, there are six levels of cognitive understanding with different aspects of learning in cognitive performance, namely first, knowledge is a person's ability to recall or recognize names, terms, ideas, symptoms, formulas, formulas and so on without expecting the ability to use them. Second, understanding (comprehension) is a person's ability to understand or understand something after something is known or remembered. The third application is the individual's ability to apply or use general ideas, procedures or methods, principles, formulas, theories and so on in new and concrete situations. The fourth analysis (analysis) includes the ability to detail a whole into parts so that the overall structure or organization can be understood well. The fifth synthesis (synthesis) is the individual's ability to detail or describe a material or condition according to smaller parts and is able to understand the relationship between the parts or factors one with other factors. And the sixth evaluation is the highest level of thinking in the cognitive realm. Evaluation here is an individual's ability to make judgments about a situation, value, or idea. So, from the 6 levels of learning aspects according to Benjamin S. Bloom, besides being able to help individual cognitive performance, this level also has something to do with learning from visual media journals and blended learning student learning journals. Because these 6 levels also help students' cognitive development towards the development of daily learning values.

But unfortunately, the lack of journals regarding student learning through visual media with the journal of developing students' cognitive maps in blended learning has several shortcomings. One of them in these two journals does not describe real examples or real research results from the presentations that have been submitted. So the examples are only based on the views of experts who are converted into data, but there are no real examples of real practice from the journals that have been presented.
Relation With Brain Gym Influence Strategy on Memory in Students.

This study discusses the brain gym which is very influential in individual learning activities, especially in terms of remembering and improving the individual's cognitive side. From this research, it can provide benefits for students, especially in improving memory skills in the learning process through Brain Gym, for universities, it can be used as a method in an effort to improve student memory in order to achieve an optimal learning process, and for researchers it can be used as study material, and consideration for improvement on the same theme in future research.

This journal already has an ISSN and has published quite a number of journals. With this publication, it is hoped that the results of this study will be useful for further research and for the general public on how to improve memory skills by using interventions. In addition, the results of this research will also be published in the form of modules that can later be used by many parties. The results of this study are expected to add new methods, especially for practitioners and people working in the field of education to improve memory skills, especially for students both at school and on campus.

In conducting the research, not all brain gym movements were used. Brain gym movements will be adapted to research interests. Memory will be measured using Digit Span which is part of the WAIS test. The design of this research is a quasi-experimental design with a pretest-posttest design. The sample in this study were students of the psychology faculty of the Makassar Bososwa University. The data analysis technique used is the paired sample t-test.

Then, the results of this journal research will explain the results and general discussion of the results and discussion of all subjects who have participated in a series of interventions. From the research conducted in this journal, it can be concluded that the measurement of memory ability was carried out once before the intervention, namely (Pretest O1) and one measurement (Posttest O2) after the intervention. Memory ability in this study was obtained from the high and low scores obtained.

The results obtained from 14 people who took part in this intervention were only 1 person who did not experience any improvement at all, in fact there was a decrease of 1 point in the Backward subtest. While others experienced an increase of 1/2 point. Based on the research that has been done, there are several things that are quite difficult to control by researchers, namely the Maturation Effect, where there is a saturation factor experienced by the research subject, so it is likely that the results obtained will be less than optimal. This is indicated by several research subjects, preferring activities outside of research for various reasons, even though in the end the research subjects completed the entire series of research that had been scheduled in the contract.
And for further researchers, the next plan is to provide input on various matters relating to memory improvement for schools ranging from elementary school to university level.

Based on the research that has been done, there are several things that are quite difficult to control by researchers, namely the Maturation Effect, where there is a saturation factor experienced by the research subject, so it is likely that the results obtained will be less than optimal. This is indicated by several research subjects, preferring activities outside of research for various reasons, even though in the end the research subjects completed the entire series of research that had been scheduled in the contract.

From the results of the research that the researchers have done on the journal references that have been searched, it can also be described that the application of the Brain Gym intervention has an influence on increasing student memory. The problem that generally occurs is that students often find it difficult to memorize and retain the information they have learned in the learning process. This therapy has something in common with previous journals on memory, which is that it has similarities with the Mneumonic method. Where, these two methods are equally used by educators for students to help improve memory and memory in teaching that has a lot of memorization and a lot of words. Both of these methods can be applied both in the realm of students and the realm of school, the difference is that the brain gym itself is a brain exercise that is done with simple movement exercises to make it easier and feel relaxed in starting learning and at the same time helping individuals adapt to daily demands. That is, this method also helps individuals to be able to learn optimally even though there are many challenges and tasks that must be done that have been given by the lecturer/teacher. Individuals are required to keep the brain working well as well as to train memory or individual memory to be more honed. Memory itself is part of cognitive development, it is said to happen because every human being learns, always uses or uses his memory abilities. According to Santrock (2007) Memory is the storage of information over time. So this brain gym method is a method to improve memory that is quite effective to use before starting school or college.

Meanwhile, compared to the brain gym method, the mnemonic method is much simpler to apply. Where, the mnemonic method itself is applied in a useful way to learn facts. Mnemonic devices or tools are strategies to improve memory by using chants, jingles, stories, or linking techniques. This device helps focus attention on what is to be learned and facilitates blocking and retrieval of long-term memory. By using mnemonic strategies change the information that can be learned to be more meaningful, by establishing a relationship between information and prior knowledge. So, the mnemonic method itself is a learning method that is applied by educators by
using songs, codes, jingles or other connecting techniques carried out by educators to help students / students memorize or remember the material that has been delivered.

The storage process allows psychologists to classify memories based on their permanence (Winker & Cowan, in Santrock 2007). Short-term memory is a memory system with limited capacity in which information is actually stored for 15 to 30 seconds, unless people use strategies to retain it. Long-term memory is a relatively permanent and indefinite type of memory. People usually refer to long-term memory when they talk about “memory”. These two types of memory help individuals in improving memory classification through the brain gym that when individuals successfully apply the method of remembering by doing this brain gym method, the memories or memories that have been obtained will be passed on to STM or short-term memory. Here, in a short time the individual will remember the information that has been obtained and try to be implanted in the individual's brain. In this STM, individuals tend to experience forgetfulness, so to increase it, individuals need to recall or recall so that the information can still be remembered and embedded in the individual. This is also in line with the mnemonic method dealing with short-term memory. Where the encoding and coding using cues or songs that are easy to remember will be passed on to short-term memory and also need to do a recall so that the information does not just disappear. In essence, both methods, both brain gym and mnemonic methods, are very much needed and help individuals sharpen memory. Both of these methods both strengthen our short-term memory which, if continuously improved, will have an effect on long-term memory. If it has reached long-term memory, then what information we have received and absorbed will not be easily forgotten or simply lost. Because in LTM the information that has been obtained will be remembered by the individual for a long period of time.

Mnemonic is a strategy in encoding information so that it can be stored in Intermediate Long Term Memory properly and facilitate the process of retrieval of information. This opinion is supported by RL Solso, OH Maclin & MK Maclin (2007), and other scholars, stating that Mnemonic is a strategy to increase the storage and retrieval of information in or from memory. It also shows that Mnemonic is used in the encoding process, in order to increase storage and simplify the information retrieval process (Solso, Maclin & Maclin, 2007; Anshorulloh, 2008; Wijaya, 2010; and Asmarani, 2013). In essence, this mnemonic method serves to help improve the memory or memory of students or students to memorize and remember the material presented by the lecturer or teacher. An easy example of a psychology lecturer giving a behavior modification theory the name "ABC Theory" which means A (Antecedent), B (Behaviour) and C (Consequences). Lecturers give an acronym with the name ABC Theory which aims to make it easier for students to remember this theory to make it easier if they have reached a further or
more complex material stage. In short, both methods of increasing memory, both brain gym and mnemonic strategies, are both good at improving cognition, memory and individual abilities in memorizing, encoding information, storing and retransmitting information that has been obtained in a better and structured way.

According to Tulving, memory is the ways in which individuals can retain and draw on experiences from the past for use in the present (Sternberg, 2006). Santrock (2007) explains that memory is the storage of information over time. Encryption, storage and recall are the basic processes required by memory. Understanding of memory itself is part of cognitive development, this happens because every human being learns, always uses or uses his memory abilities. According to the view of E. Dennison Phd (2013) states that brain exercise or commonly referred to as this movement is made to stimulate the left brain and right brain (lateralization dimension) relieve or relax the back of the brain and the front of the brain (focusing dimension), stimulate related systems, with feelings or emotions, namely the midbrain or limbic and the midbrain (the dimension of concentration). Some examples of concentration from several dimensions of concentration in brain exercise include:

1. Lateral Dimension.

Cross Movement. The way to do this movement is to start by moving your right hand with your left foot and your left foot with your right hand. Move forward, sideways, backwards, or walk in place. To cross the midline, the hand should touch the opposite knee. Then by sleeping (Lazy 8). The way to do the movement is to start from the movement by making the figure eight sleep in the air, the hands clench and the thumbs up, starting by moving the fist to the upper left and forming a sleeping figure eight. Followed by eye movements looking at the tip of the thumb. Make a figure 8 sleep 3 times each hand and continue 3 times with both hands. Next, there is a Double doodle by drawing with both hands at the same time, inward, outward, up and down. Double doodles in real shapes such as circles, triangles, stars, hearts, etc. Do it with both hands.

2. Focusing Dimensions.

This focusing dimension includes several techniques or methods as follows:

a. First technique Owl (The Owl). The way to do the movement is to start by massaging the left and right shoulder muscles. Inhale while your head is in the center position, then exhale sideways or into tense muscles while relaxing. Repeat the movement with the left hand.

Activating Hands The way to do the movement is by straightening one hand up, the other hand to the side of the ear holding the hand up. Exhale slowly, while the muscles are
activated by pushing the hand in all four directions (front, back, inside and outside), while the one hand resists the push.

b. **The Footflex (The Footflex)**

In this technique it is necessary to perform movements by gripping the painful areas in the ankles, calves and behind the knees, one by one, while slowly waving or moving the legs up and down.

**Gravity Glide** In this technique, it is necessary to perform the movement, starting with sitting in a chair and crossing your legs. Bend down with your hands in front of you, exhale when you go down and inhale when you go up. Repeat 3 times, then switch legs.

c. **Mount the Horses**

How to do this movement start with the legs open. Point your right foot to the right, and keep your left foot straight forward. Bend your right knee while exhaling, then inhale as your right knee is straightened again. The hips are pulled up. This movement strengthens the hip muscles (can be felt in the straight leg) and helps stabilize the back. Repeat 3x, then switch to the left leg.

---

3. **Centering Dimension**

The third dimension is the dimension of concentration which is carried out with several movements as follows:

a. **Water**

Water is an excellent carrier of electrical energy. Two thirds of the human body consists of water. Water can activate the brain for efficient electrochemical connection between the brain and the nervous system, storing and reusing information efficiently. Drinking enough water is very beneficial before facing a test or other stressful activity. Water requirement is approximately 2% of body weight per day

b. **Brain Switches (Brain Buttons)**

How to do the brain switch movement (soft tissue under the collarbone on the left and right of the breastbone), massage with one hand, while the other hand holds the navel.

c. **Earth Buttons**

How to do the movement is to place two fingers under the lips and the other hand on the navel with the fingers pointing down. Follow with your eyes a line from the floor to the attic and back while breathing deeply. Breathe the energy up, into the center of the body.

d. **Balance Buttons**
How to do the movement is by touching 2 fingers behind the ear, in the crook of the skull below and placing the other hand on the navel. Head should be straight ahead, while breathing well for 1 minute. Then touch the back of the other ear.

e. Space Key
How to do the movement is by means of 2 fingers above the lips and the other hand on the tailbone for 1 minute, breathing energy towards the top of the spine.

f. Plug Ears (The Tinking Cap).
How to do the movement is starting from massaging the earlobe slowly, from top to bottom 3x to 5x.

g. Relax hooks (Hook-Ups).
How to do the movement First, place the left foot on the right foot, and the left hand on the right hand with the thumb down, the fingers of both hands gripping each other. Then pull both hands toward the center and continue in front of the chest. Close your eyes and when you inhale your tongue is pressed against the roof of your mouth and released again when you exhale. The second stage, open the legs crossed, and the fingertips of both hands gently touch each other, on the chest or lap, while breathing for 1 more minute.

h. Positive Point (Positive Point)
How to do the movement is to touch the fingers on positive points with both fingertips for 30 seconds to 30 minutes.

So it can be concluded from the explanation of the journal about visual media that this method of improving memory is very helpful and the presentations of brain exercise movements through several dimensions ranging from the lateral dimension, focusing to the dimension of concentration, reduce tension.

However, from this visual media journal, it does not describe real examples of research that was researched directly but is limited to the division of dimensions to improve individuals and in the discussion section of the research it is only described in outline about the development of the brain gym in several schools but only in outline. Meanwhile, in journals about the mnemonic method or journals with visual media and learning KMK, they explain in more detail and in more detail about research data and discussions related to human cognitive memory. These journals can explain in detail how the data was obtained and from where, then researched using what research and also how the steps have been clearly covered.
Conclusion

Based on the presentation of the results of the research and the discussion that has been submitted, it can be concluded that from various types of research and their relation to the memory models that we have described, it can be seen that there is a real influence between the memory models that are mastered by individuals and the learning abilities of students. As in the research journals that we have been looking for, we explain that starting from the mnemonic method, the working memory capacity (KMK) method, visual media to doing brain gym are very closely related to the role of individual cognitive development. This also affects the factors that affect the cognitive performance of students, including the forming factors that play a more important role in the way the lecturer delivers material in class which will affect the students' cognitive performance, the freedom factor, namely the lecturer gives freedom for each student to ask questions about the subject not understood during class, and also environmental factors that also affect student cognitive performance, therefore students usually make friends or hang out with people who according to him have a positive impact on themselves and can also be relied on in collaboration.

From the explanation that has been described above, it can be concluded that memory is a Phenomena are complex and varied. Opinions from several educational psychologists explain how information can be stored and encoded for later re-disclosure based on a specific purpose. The theory of memory reveals that memory is not only a storage system for what information we get, but also a memorable event from ourselves that can be influenced by other people or through future events.

From this memory developed into several types of memory including sensory memory, short term memory (STM), long term memory (LTM), implicit memory, explicit memory and flash memory. So the point that can be obtained is that memory is a complex and varied phenomenon, with memory it will make an individual's life feel sustainable, which means humans can relate what happened in the past with the conditions experienced now. Memory also has several stages, namely encoding, storage, and recall. From these types of memory, what is called the mechanism of how information received by humans can be absorbed and understood. Starting from the information that individuals catch or hear from others, then it can go through 3 methods of absorbing information. First, the Aus theory is that memory disappears over time if it is never sharpened. So at this stage there is a need (recall) so that information can be forwarded to LTM and not easily forgotten. Second, there is an inference theory, namely memory is like a white canvas which is then painted into a good shape. Any information or input or important things that we have received should be realized immediately or passed on to long-term memory (LTM) so
that we don't forget easily when we only arrive at STM. And the third is the theory of information processing (Information Processing). This theory explains how the information process is processed and is also an active process that involves input from phenomena/symptoms in reality, memory processes or remembering, perception and thinking. So the processing of information is not only to accommodate what information is obtained but also to process the results of the information obtained whether an information will be removed, added, or changed. Will the information only remain in the STM which is likely to be forgotten when a large amount of information is obtained or will it be passed on to long-term memory in the LTM so that the individual will always remember it for a long time.

Based on the explanation above, it also explains that this research uses a literature study method that has been carried out on several studies. As is known, that the study of literature is a series of activities related to the methods of collecting library data, reading and taking notes, and managing research materials. Another explanation, according to Danial and Warsiah, is the literature study method, which is a research conducted by researchers by collecting a number of books and magazines related to the problem and research objectives. This technique is carried out with the aim of revealing various theories that are relevant to the problems being faced/researched as reference material in the discussion of research results.

Researchers used various references from journals and several websites to support the making of this article. With references from journals and websites, it is hoped that apart from being able to contain many references to memory models, it can also help readers understand memory not only theoretically, but also based on real examples of journals that researchers have been looking for.

In the results of research from journals that have been searched on "The Effect of Mnemonic Methods on Mathematical Reasoning Ability and Memory" it can be explained that the mathematical reasoning ability of students whose learning uses the mnemonic method is obtained from the results of the mathematical reasoning ability test conducted at the seventh meeting. In determining the value of the mathematical reasoning ability test, it is carried out in accordance with the ability test scoring guidelines. By using the effective mnemonic method on the mathematical reasoning ability and memory of students. Therefore, students are required to first design a mathematical model then students manipulate or manage (do) in the right way.

In the journal, it is explained that there are a number of processes taken by problem solvers in developing problem representations by interpreting the problem statements proposed. In the solution phase, the problem solver uses the problem representation to activate long-term memory (LTM) elements in the search for possible solutions in the solution space. This allows
searching for relevant problem solving schemes, algorithms, strategies, or candidate solutions. This study itself reviews, there are several processes involved in solving mathematical problems which show problem solvers are influenced by working memory capacity, namely skills in executing sequences and retaining partial results, efficient retrieval of facts and mathematical knowledge of structures such as problem schemas, and successful transformation of problem representations.

The essence of this journal is that mathematical problem solving supports that working memory capacity helps in the storage and processing of information. Working memory capacity is very helpful when solving problems, in this case an example is a multistep math problem such as an arithmetic problem.

Furthermore, the journal "Improving student learning attention through visual media", research in this journal examines issues related to efforts to increase the attention of elementary school students, especially early graders to their learning tasks during the learning process. The study focused on the use of visual learning media to increase students' attention in learning. Researchers refer to attention as a series of processes that enable and guide the selection of incoming perceptual information. Cognitive psychological theories view attention as a series of processes that enable and guide the selection of incoming perceptual information to limit external stimuli processed by a limited cognitive system so that it is not excessive. Following important elements characterizing attention people usually report that the object of their focus is at the forefront of their consciousness when they are present, the object or information on which attention is focused usually becomes clearer and clearer than any other possible object or thought; (3) this process involves selecting one from a variety of possible stimuli or thoughts at any given moment; and (4) when attention is highly focused, other unrelated stimuli are out of consciousness and persist until there is detachment from the primary focus of attention.

This journal explains about the effect of using a puzzle-assisted learning model on the visual memory ability of deaf students in grade 2 elementary school. The researcher used a one group pretest posttest design in this study. In the one group pretest-posttest design, the experiment was carried out in one group with two kinds of data obtained by the researcher, namely, the initial ability and final ability of the visual memory of deaf students in learning materials about recognizing symbols and names of numbers 35-45. Puzzle-assisted learning helps with automatic word recognition which can ease memory loading during reading comprehension actions. The results were shown from learning outcomes after being given treatment, students were very enthusiastic in learning activities using number name puzzles that introduced number
names in an interesting and easy way. And the effect of the puzzle-assisted learning model for deaf students is to increase the visual memory ability of number names for deaf students.

Journal of “Strategy for the Effect of Brain Gym on Memory in Students”. This journal discusses the brain gym which is very influential in individual learning activities, especially in terms of remembering and improving the individual’s cognitive side.

The results of this study are expected to add new methods to improve memory skills, especially for students both at school and on campus. Brain gym movements will be adapted to research interests. Memory will be measured using Digit Span which is part of the implementation of the intervention that has an effect on increasing student memory. The following are examples of concentration from several dimensions of concentration in brain exercise including:

1. lateral dimension
   By doing a cross. The way to do this movement is to start by moving your right hand with your left foot and your left foot with your right hand. Move forward, sideways, backwards, or walk in place. To cross the midline, the hand should touch the opposite knee. Then by sleeping.

2. Focusing Dimension
   a. First technique Owl (The Owl). The way to do the movement is to start by massaging the left and right shoulder muscles. Inhale while your head is in the center position, then exhale sideways or into tense muscles while relaxing. Repeat the movement with the left hand.
   b. The Footflex
      In this technique it is necessary to perform movements by gripping the painful areas in the ankles, calves and behind the knees, one by one, while slowly waving or moving the legs up and down.
   c. Mount the Easel
      How to do this movement start with the legs open. Point your right foot to the right, and keep your left foot straight forward. Bend your right knee while exhaling, then inhale as your right knee is straightened again. The hips are pulled up. This movement strengthens the hip muscles (can be felt in the straight leg) and helps stabilize the back. Repeat 3x, then switch to the left leg.

3. Concentration Dimension
   a. Water
      Water is an excellent carrier of electrical energy. Two thirds of the human body consists of water. Water can activate the brain for efficient electrochemical connection between the brain and the nervous system, storing and reusing information efficiently. Drinking enough water is very beneficial before facing a test or other stressful activity.
b. Brain Buttons
   How to do the brain switch movement (soft tissue under the collarbone on the left and right of the breastbone), massage with one hand, while the other hand holds the navel.

c. Earth Buttons
   How to do the movement is to place two fingers under the lips and the other hand on the navel with the fingers pointing down. Follow with your eyes a line from the floor to the attic and back while breathing deeply. Breathe the energy up, into the center of the body.

d. Draw button.
   By touching 2 fingers behind the ear, in the crook of the skull below and placing the other hand on the navel. Head should be straight ahead, while breathing well for 1 minute. Then touch the back of the other ear.

e. Space Key
   How to do the movement is by means of 2 fingers above the lips and the other hand on the tailbone for 1 minute, breathing energy towards the top of the spine.

f. Plug Ears (The Tinking Cap).
   Starting from massaging the earlobe slowly, from top to bottom 3x to 5x.

g. Relax hook (Hook-Ups).
   Place the left foot on the right foot, and the left hand on the right hand with the thumb down, the fingers of both hands clasped together. Then pull both hands toward the center and continue in front of the chest. Close your eyes and when you inhale your tongue is pressed against the roof of your mouth and released again when you exhale. The second stage, open the legs and fingers of both hands touching each other on the chest or in the lap, while breathing for another 1 minute.

h. Positive Point (Positive Point)
   By touching the fingers on positive points with both fingertips for 30 seconds to 30 minutes.

The explanation of the technique about that the method of improving memory in this way is very helpful and the presentations of brain exercise movements through several dimensions ranging from the lateral dimension, focusing to the dimension of concentration, these three things in the researcher's view are very effective in addition to providing a relaxing effect and reducing tension.

References


Grace, AB (2018). The Effect of Brain Gym on Memory in Students of the Faculty of Psychology, University of Bosowa Makassar. Ecosystem scientific journal, 18(1), 1063-107.
