

The Use of Mnemonic and Mathematical Mnemonic Method in Improving Historical Understanding

Lee Bih Ni, Nurul Asyikin Binti Hassan

Abstract—This paper discusses the use of mnemonic and mathematical methods in enhancing the understanding of history. Mnemonics can help students from all levels including high school and in various disciplines including language, math and history. At the secondary level, students are exposed to various courses that require them to remember many facts that can be mastered through the application of mnemonic techniques. Researchers use narrative literature studies to illustrate the current state of art and science in the field of research focused. Researchers used narrative literature reviews to build a scientific base of knowledge. Researchers gather all the key points in the discussion, and put it here by referring to the specific field where the paper is essentially based. The findings suggest that the use of mnemonic techniques can improve the individual's memory by adding little effort. In implementing mnemonic techniques, it is important to integrate mathematics and history in the course as both are interconnected as mathematics has shaped our history and vice versa. This study shows that memory skills can actually be improved; the human mind can remember something more than expected.

Keywords—Cognitive strategy, mnemonic technique, secondary school level study, mathematical mnemonic.

I. INTRODUCTION

IT is a requirement for a student to remember the various facts in the mastery of a science, whether it is language, mathematics, history and so on. Individual failure to master something is not caused by their cognitive disabilities, but rather to the selection of the cognitive strategies they use. Among the failures in the mastery of knowledge are the use of inappropriate cognitive techniques or strategies. In addition, lazy attitudes to trying memory-assisting techniques are also one of the reasons why many have a low level of memory. An effective technique in enhancing individual memory capabilities is mnemonic technique. This technique makes the process of remembering something easier. Mnemonics use the principle of association, which is the information to be remembered associated with other information that is easy to remember. It drives memory to remember the facts by associating it with simpler and easier information and data available. Mnemonics can capture information in a form that is easy to remember to help someone remember something that matters [1]. Mnemonics can help students from all levels whether pre-school, primary, secondary, and tertiary education

Lee Bih Ni is with the Faculty of Psychology and Education, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia (e-mail: leeh_ni@yahoo.com).

Nurul Asyikin Hassan is with Council of People Trust (Majlis Amanah Rakyat, MARA) Science Junior College, Education Department, Kota Kinabalu, Sabah, Malaysia (e-mail: leeh_ni@yahoo.com).

to keep in mind all the frequently-used information and immediate information. The mnemonic types used are various, depending on the type of man that varies from one another. Other people have different ways or means to remember something. What is important is that everyone should use mnemonic methods that are appropriate to them and work well. Among the commonly used mnemonic techniques are loci methods, keyword systems, chunking, acronyms and acrostic techniques. In addition to ease of memory, this technique is very helpful in remembering many complex facts as well as improving memory input, reducing stress and helping widen the scope of memory in the max. This technique demonstrates that memory skills can actually be improved, the mind can remember something more than expected and by using the appropriate techniques will facilitate the memory process. Hence, the use of mnemonic techniques in the present and future is very much needed, especially for students who need to bear in mind many important facts [2].

II. LITERATURE REVIEW

A. Secondary School Students Definition

Secondary schools often refer to form one to five students whose style of study is quite different from those of lower-level students. However, the true nature of the secondary school word is to refer to a system of pre-university education before attending the Malaysian High School Certificate (*Sijil Tinggi Persekolahan Malaysia/STPM*) or Diploma program. In this study, secondary school students refer to students who are in the form of one to five, lower secondary students and also upper secondary students. This group of students is composed of those who just have just completed the primary school level. The secondary school level can also be considered as a transition period from primary to secondary school. Hence, this group of students should be equipped with basic learning skills in preparation for stepping into the more challenging Form Three Assessment (*Pentaksiran Tingkatan Tiga/PT3*) and Malaysian Certificate of Education (*Sijil Pelajaran Malaysia/SPM*). These basic skills include skills to improve memory. This is because the curriculum form at the Secondary School Standard Curriculum (*Kurikulum Standard Sekolah Menengah/KSSM*) is basically basic knowledge that includes facts that must be remembered and mastered [12].

B. Definition of Mnemonic Method

The mnemonic word (mnemonic) is from the Greek word meaning 'to remember'. Mnemonics have been used since over a thousand years ago by Greece and Rome. The ancient

Greeks too adored memory, such that they had a god called Mnemosyne, meaning thought carefully. A variety of memory strategies are designed by them to help remember information, aiming to attract listeners when addressing or arguing in the Senate. Modern mnemonic words refer to memory driving techniques to remember facts by associating them with simpler forms of information and data.

III. METHODOLOGY

In this paper, narrative literature is used to describe the current state of both art and science in the focus. The researcher used a literary narrative research to build the foundation of scientific knowledge, and collect all the important points in the discussion and put them here with reference to the particular field in which this paper was originally based.

IV. FINDINGS

A. Type of Mnemonic Methods

1. Loci Techniques

Loci means location is a mnemonic technique that works by associating a place or objects in a location that is known for the things to be remembered. For example, we will create a presentation that contains three main topics. Each section of the presentation will be associated with a marker representing the presentation sequence. For example, we try to imagine a classroom. The flower pot in the corner of the classroom is the first thing we see when moving forward. We choose the flower vase to remind us of congratulations on lecturers and classmates in the classroom. The lights in the class are selected to remind us of the next topic or the contents of the speech, and possibly the door of the class is selected to remind the closing part of the presentations we will convey.

When we want to use this technique, we need to choose a place that is very close to ourselves like home, car, office or something else. Another example is, if we want to remember the list of kitchen items to buy which consists of tomato sauce, onion, banana, and soy sauce. We know we will be back home by driving a car. Spend our time imagining this. The tomato sauce bottle breaks and spills in the car bonnet, we cover the bonnet firmly and the tomato sauce is frowning out. The onion is hanging over the car window mirror, the banana jumps out of the car radio, and the soy sauce is spilled over the car cushion.

Now, when we get into the car to go home from work and want to remember what to buy, we only need to look at the hood of the car, and the others will reappear in our imagination.

The more weird and unique our imagination is, the easier it is for us to remember.

2. Keyword Techniques

These mnemonic techniques have been used by people over the years, especially to remember foreign language words and abstract concepts. This technique is another association that associates verbally and visually equivalent words with words

or concepts to keep in mind. For example, remembering the word *muallimah* (female teacher) in Arabic we associate it with *Mak Limah* because the word is easy to remember, as another example, to remember the meaning of the word, hyperbolic (excessive love in telling something), try to imagine a keeper who cannot catch the ball soaring high. Similarly, in learning a foreign language, mnemonic techniques are very helpful in remembering new words and meanings. For example, remembering the word door, mirroring and hitting in Arabic is by using the same words as the Malay language. So the door (*baa-bun*) sounds like a baboon (a baboon in the door), the mirror (*mer-ah*) sounds like red (red mirror) and hit (like a doroba) with the name Drogha soccer player (Drogha hit the player ball) [8].

3. Connect Technique

Connecting is the process of associating or associating one word with another word through an action or an illustration. This strategy is commonly used with a word marker system to remind a series of information in a particular order. With the word marker strategy that has been taught earlier, for example, the telephone number 019-441 0467 can be remembered by being linked with (4) damaged car wheels drawn by large lorries that are also wheeled (4) to a corner that exists (1) empty (0). The large wheeled wheel (4) carries half dozen eggs (6) to eat during a week (7). Or you want to simplify the process of remembering it by combining numbers in multiple units, so that numbers can be remembered more easily. The key to making relationships is to use imagination. The formed relationship does not need to be logical or realistic, it is important that the relationship triggers your memory [3], [8].

4. Acronym

Acronym is a word that results from the first letter of a series of words. One of the notable acronyms is NASA, the space agency of the United States, stands for the National Aeronautics and Space Administration. Organizational names are often shortened in the form of acronyms, for example KUIS acronyms of Kolej Universiti Islam Antarabangsa Malaysia (International Islamic University College of Malaysia). Acronyms are time-consuming to use a second letter (usually vowels) so abbreviations are easier to read but the acronyms do not necessarily form words. Use our imagination if we need to remember the five things we need to do when we go home, for example, cuci baju, mandi, memasak, solat, dan baca Quran (washing clothes, bathing, cooking, prayer, and reading the Quran). Automatically, we will be able to trigger our memory by creating a BM2-SQ acronym.

In Islamic studies, for example, remembrance of the rules of marriage comprised of Suami, Isteri, Saksi, Wali dan Akad (Husband, Wife, Witness, Guardian and Charter) may be abbreviated using the SISWA acronym method.

5. Acrostic

Acrostic-like acronyms also use key letters to make the abstract concept more concrete, making it easy to remember. However, acrostics do not always use the first letter and do not

necessarily produce abbreviations in one word, the information remembered in acrostic can be a certain word or phrase. For example, to remember the colorful sequence of rainbows, the use of acrostic *mamat* to sell green beans is a lot of profit: red, orange, yellow, green, blue, indigo, purple. Another example is that we can recall the Qalqalah letters in the tajwid reading al-Quran by creating acronyms "baju di toko (shirt in the shop)" for "ba, Jim, Dal, Tho, Qof" [7].

For example, in remembrance of the length sequence in the metric system, we can use mnemonic techniques by using paragraphs; *Maka Cina Dengan Melayu Duduk Hampir Kilang* (So Chinese With Malay Sit Near The Factory). This is an acrostic technique for the order of metric sizes: Millimeter, Centimeter, Decimeter, Meter, Decameter, Hectometer and Kilometer [8].

Another example that is always used is when we memorize the colors of the rainbow; *Mamat Jual Kacang Hijau Banyak Ia Untung* (Mamat Selling Green Beans Many It's Profit) which represents the colors of Merah, Jingga, Kuning, Hijau, Biru, Indigo, Ungu (Red, Orange, Yellow, Green, Blue, Indigo, Purple) [8], [7].

B. Technical Principles of Mnemonic

The use of mnemonic techniques can improve the individual's memory by simply adding a little effort. In implementing mnemonic techniques, some basic principles need to be addressed [9]:

1. Use of mental images. Remembering visual images is easier than remembering words. So we need to change the information to the mental image to be happy to hear.
2. Make it meaningful. By making things memorable as meaningful, it can transfer information from short-term memory to long-term memory. If we want to remember something but it does not mean to us, then we have to give it a meaning so it's easy to remember.
3. Make information an ordinary thing. Connect information with something we already know.
4. Forms of odd, extraordinary and exaggerated mental associations. Odd images will make the information you want to keep up to date and be memorable.

C. Remember Historical Facts

Ling [11] undertook an action study aimed at enhancing the ability of Form 1 Amanah SMK Engkilili students to remember historical facts using mnemonic methods. In the study, researchers have collected data in several ways, such as interviews with six students, referring to their own diary, analyzing student notes, discussing with other history teachers and observing students during the process of mnemonic methods. Researchers have implemented mnemonic methods in two stages. The first stage involves the introduction of mnemonic methods and is carried out individually, while at the second stage, this method is implemented in a group. The study eventually found that mnemonic methods can help students memorize historical facts more effectively and make them easier to review. In addition, student creativity can also be found.

Ngah et al. [10] in a study titled *Mnemonic Learning Technique in Form Four Islamic Education* explained the problem of remembering as being the main challenge for mastering the topics contained in the Form Four Islamic Education subject to containing the facts, which requires a suitable learning style to strengthen memory. This study was carried out with the aim of looking at the use of Mnemonic Learning Techniques to improve memory and achievement of Form Four Islamic Education subjects. The Mnemonic techniques applied in this study are the acronyms, keyword techniques, loci techniques, acrostic techniques, and puncture techniques. The conclusions of the study show that mnemonic techniques give students the necessary techniques to organize information more easily and to have the ability to extract information at any time required. Therefore, mnemonic-related techniques are essential to facilitate the teaching and learning process of students. The result of this study shows that mnemonic technique affects student learning and can be used as an alternative to the teacher to apply it in the classroom. Effective learning techniques in the classroom need to be examined so that they can attract students, increase student motivation, improve student self-esteem, apply concepts effectively to students and indirectly improve their achievement in exams.

Yahya [4] conducted an action study to improve the achievement of the 6th year student listing the factors affecting agricultural activities in the subject of Local Studies using the method of mnemonic acrostics. The subjects of the study consisted of five students of the 6th year of Mars who experienced problems in remembering the factors affecting agricultural activities. The data were collected through pre-test and post-test, observation and interview. The results of the test data analysis showed that the percentage of the subjects of the study was significantly increased, with four people getting a full score of 100% and a subject of 92.30%. The findings of interviews and observations show that this method of mnemonic acrostics helps subjects to list factors affecting agriculture. The results of the study show that the method of mnemonic acrostics can improve the achievement of the 6th year student in listing the factors affecting agricultural activity in the subject of Local Studies.

Latifah [6] in his study has been researching three things: 1) to find out how far the number of Arabic language vocabulary of class VIII students in MT.s Walisongo Sugihwaras Bojonegoro, 2) to know the application of mnemonic strategy in increasing the acquisition of the Arabic vocabulary of grade VIII students in MT.s Walisongo Sugihwaras Bojonegoro and, 3) to know the effectiveness of mnemonic strategies in increasing the acquisition of the number of Arabic language vocabulary of grade VIII in MT.s Walisongo Sugihwaras Bojonegoro. In answering the question, researchers have used quantitative methods with t-test applications. While the methods used in data collection include observation, interviews, documentation, testing and data analysis methods. The results showed that there was a significant increase in the acquisition of the Arabic vocabulary of class VIII students in MT.s Walisongo, Sugihwaras Bojonegoro by using mnemonic

strategies.

Khoirunnisa [5] in the next study has once again focused on the effectiveness of mnemonic techniques in the mastery of the Arabic language vocabulary of students in the XI IPA Madrasah Aliyah Negeri 1 Bandung year of study 2013/2014. This study was conducted using quasi-experimental method, with non-equivalent control group design. The researchers set up experimental groups and control groups of 30 people each. Furthermore, the experimental group was given intervention (treatment) which was the use of mnemonic techniques, while the control group was not implemented the same technique. The results of the study have shown that there are positive and significant relationships and influence on the ability to remember the vocabulary using mnemonic techniques. Among the recommendations of this study is the need for students to be more careful in selecting cognitive strategies that can be used for Arabic language vocabulary learning. Meanwhile, educators need to be more innovative in the process of teaching Arabic vocabulary.

D. Mathematical Mnemonic in History Learning

It is very important to integrate mathematics and history in the course; both are interrelated because mathematics has shaped our history and vice versa. In this lesson, we discuss examples of activities that can be used to involve K-12 students in history and mathematics.

The ancients talked to math before the language was spoken or written. Ishango bone, considered as one of the earliest relics depicting mathematical calculations, began 20,000 years ago. It was found in the African region of the Congo, and it shows a gap that depicts the numbers collected or grouped. These bones are evidence of the mathematical practice of early human history and show how mathematics and history can be interspersed for thousands of years.

Through the Middle Ages and modern prehistoric times, mathematics has become part of history; unfortunately, it has been neglected in the K-12 curriculum. Teachers are encouraged to focus on teaching a subject of History. However, they can cross the curriculum by bringing elements of Mathematical methods in teaching and learning History [13].

1. Math Schedule

For students from elementary to high school, an interesting activity can include creating timelines for historical progress in mathematics, discovery and historical figures. The math schedule will provide the entire student with math and visual representation throughout history.

This activity may take days, weeks, or the entire period to occur. Due to the discussion over a period of time, math related projects that occur can be published in appropriate places on the timeline.

Students can create a long list of papers attached to a wall, or they can also use the online tools of visual scheduling to work, such as establishing a readwritethink.org timeline.

The first timetable entry is Ishango bones!

2. Greek History and Mathematics

As learners know, many mathematical terms come from Greek words or letters. For example, the word polygon comes from the Greek poly, meaning a lot, and *gon* from the word *gonia*.

Interesting activities for primary and secondary school students combine this term with some Greek history, such as the Olympic Games.

A series of lessons learned can include a brief history of the Olympics, learning math terminology in Greek, and then culminating in the Greek Mathematical Olympiad where students must do something like:

- a. After listening to the name of the polygon, draw the polygons correctly on the board (for example, the teacher says the name of the polygon, for example, a dodecagon, and the student tries to draw a polygon with twelve squares).
- b. Relay race to the board to adjust the definition of Greek mathematical terms or letters (for example, pi matches its circle diameter ratio).
- c. Specify Greek symbols that are specifically used in math (for example, delta call teachers and delta first students indicate point changes).

The types of games students can play at the Greek Olympics are limited by your imagination.

3. Pythagoras

Pythagoras, the great ancient Greek philosopher, and the mathematician of the 6th century BC were not discussed without mathematics lessons and history, the theorem responsible for spreading his name: the Pythagorean Theorem.

Pythagoras is not only a talented mathematician and philosopher, but he is also a leader known as Pythagorean, who believes the universe is understood in terms of the total number. He is also a rather weird guy with strange hatred of beans (just like rice and beans!). Similarly, it is said that when he was chased by anger and refused to flee across the field, he was arrested and killed [13].

Understanding Pythagoras and his adventures in Greece, Italy, and Egypt are the best ways for your students to master math and history. Activities may include making physical models as proof of the Pythagorean Theorem.

Asyikin used mathematical mnemonic notes (mathematical formulas) in the form of graphs to explain the history of development in Europe to form 4 science stream students at MRSM (Council of People Trust (*Majlis Amanah Rakyat*, MARA) Science Junior College) [14].

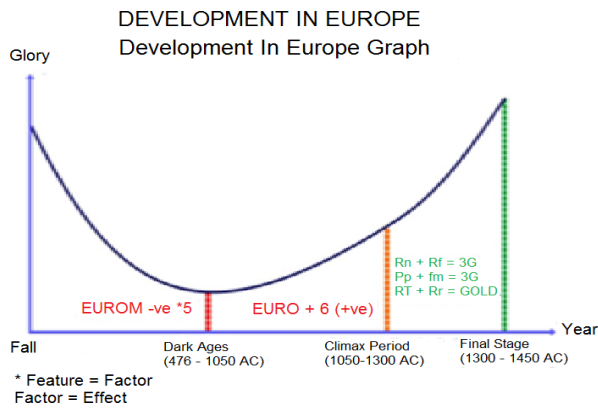


Fig. 1 Mathematical Mnemonic Notes Graph

V. CONCLUSION

One of the amazing human advantages is memory. Humans can recall what happened to them even though it may have happened long ago. Memory is a biological process, coded information, stored and recalled. Since memory is a process, the process must run well and optimal. The complaints argued that "I'm a fool, I have no ability, and my memory is weak" is certainly very different from the fact that we really have the information storage capacity. We as humans have a brain that has great power even beyond the computer. But sometimes we do not know how to use the power of the brain, especially in remembering something.

Our ability to remember something is truly amazing, but there may be several factors that make the process bothered. Many factors affect our ability to remember something. Mnemonic techniques such as loci, keyword, acronyms, acrostic, and speakers techniques make it easy to remember something. Using mnemonic techniques in remembering information has many advantages, the time it takes to remember is shorter and the memory will be stored in our long-term memory. Being familiar with mnemonic techniques in our daily lives may make us aware of the greatness of our minds.

Based on this discussion, it can be concluded that the mnemonic method can be used as a method or teaching technique for lecturers in institutions of higher learning and learning for students. The use of this technique is not limited to any subject or course of study, only the innovation and creativity of the lecturer itself. The suitability of this method is more meaningful if the lecturers and students themselves have a high creativity in forming a phrase. Hopefully this way, teaching and learning in the classroom will be easier and more interesting. This is particularly relevant to the current and future students' conditions which require the simple form of teaching and learning without affecting teaching and learning objectives.

REFERENCES

- [1] Asmawati Desa, Getrude Cosmos, Mariny Abdul Ghani, Siti Rozaina Kamsani, Noor Aniza Ishak, Nabisah Ibrahim and Mohd Makzan Musa. 2015. *Introduction to Psychology*. Kuala Lumpur: SJ Learning.

- [2] Azizi Yahaya, Asmah Suboh, Zurihanmi Zakariya and Fawziah Yahya. 2005. *Cognitive Applications in Education*. Pahang: PTS Professional Publishing Sdn. Bhd.
- [3] Ciccarelli, S. K. & White, J. N. 2012. *Psychology (third edition)*. Prentice Hall: Nerw Jersey.
- [4] Khairulnaimah Binti Yahya. 2014. Improving the achievement of 6th year pupils in the list of factors affecting agricultural activities in local studies using an acene mnemonic method. *In the Action Research Seminar 2014* vol 2-3.
- [5] Khoirunnisa, Annisa Siti. 2015. Mnemonic effectiveness in improving students' ability to master Arabic vocabulary: a quasi-experimental study on 11th grade students of Madrasah Aliyah Negeri 1 Bandung. S1 thesis, Universitas Pendidikan Indonesia.
- [6] Latifah, Siti Nurul Aini. 2015. Effectiveness of Mnemonic Strategies to Improve Language Recognition of Language Vocabulary in Class VIII in MT.s. Walisongo Sugihwaras Bojonegoro. Undergraduate thesis, UIN Sunan Ampel Surabaya.
- [7] Ma'rof Redzuan & Haslinda Abdullah. 2008. *Psychology (third edition)*. McGraw-Hill (Malaysia): Malaysia.
- [8] Maizan Binti Mat. 2017. Mnemonic Techniques As A Cognitive Strategy In Enhancing Pre-U Student Learning Capacity. National Pre University Seminar 2017 (NpreUS2017), Aug 23, 2017. Kuala Lumpur: RHR Hotel.
- [9] Mohammad Amiryousefr and Saed Ketabi. 2011. Mnemonic Instruction: A Way To Boost Vocabulary Learning And Recall. *Journal Of Language Learning And Research*, pp. 78-182.
- [10] Mohd Romei Ngah, Harun Baharudin & Mohd Aderi Che Noh. 2016. Mnemonic learning techniques in Form four Islamic education. In the 11th International Islamic Education Discourse Series, November 16, 2016. Malaysian Islamic Training Institute (ILIM) Bangi, Selangor, 1161-1171.
- [11] Tang Geok Ling. 2005. "Improving the ability of students to remember historical facts using the mneumonic method." In Proceedings of the Action Research Seminar in 2005, 3-4 October 2005. Sri Aman Division Counseling Office and MP Batu Lintang, Kuching Sarawak, 97-107.
- [12] Malaysia Ministry of Education. 2018. PT3, SPM, STPM, KSSM. Kuala Lumpur: Malaysia Ministry of Education.
- [13] Vanessa Botts. 2017. *Activities for Integrating Math & History in the Classroom*. USA: Study.com.
- [14] Nurul Asyikin Binti Hassan. 2017. The Use of Mathematical Mnemonics To Increase Understanding of Development In Europe. Master Thesis Proposal. Kota Kinabalu: Universiti Malaysia Sabah.