

## Innovative strategy in learning & memory - memorization made easy! : a preliminary study

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### Abstract

**Background:** Medical curriculum is heavily packed with information and student find very difficult to memorize this information. Acquiring knowledge involves both learning and memory, memorizing the factual information is the difficult task especially in the preclinical years as most of the information in anatomy, physiology, biochemistry involves lot of new vocabulary. Since most of the student entering the medical school is from high school background who has studied in their local language medium, sudden transition in learning with English medium is an added burden and seldom students excel in their studies. Major complaint from the student was, memorizing different anatomical terminologies, physiological neural tracts and biochemical bonds and recalling them during the examination is beyond imagination and many a time they end up in mugging up the information.

**Methods:** Based on this observation we developed a simple method/tool (charts) on the lecture. Students for this study were selected on a random selection method. Before hand the lecture on anatomy and physiology of cranial nerves was given and two groups of students, A & B were selected. A group was asked to study by their own routine method whereas group B was given the innovative proposed method. Lecture content was put in a concise way in two charts and told the student to place those charts at a visible distance in their resting area such as in front of their bed. Students were asked to glance through daily on these charts repeatedly whenever they were free and in leisure time during their relaxing time. A week long exercise was introduced and they were examined at the end of a week both by written and viva voce and compared with the students who have studied with their routine method. Based on nonparametric Spearman correlation test, (followed by Kulnogorov Smirnov two sample test to test the difference) examination scores were much higher in the group which used these flip charts (about 25 to 30% higher than conventional group).

**Results:** Analysis of their examination results and viva voce revealed a better response and memorization by this method.

**Conclusion:** In conclusion, innovative method of charts helps in a better memory retention and this study needs to be expanded further using a bigger student group for its scientific authenticity.

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### Introduction

Medical curriculum is heavily loaded with knowledge information which a medical student cannot avoid. Retention of factual information is generally short lived in terms

of memory and simple reading is not just sufficient to store this information. A medical student needs to memorize all the factual information for providing a better health care to the patients. Most of the students seeking admission in a medical school are the fresh high school grade students and in the initial years of medical studies including Anatomy, Physiology, Biochemistry and Pharmacology (preclinical) is a heavy burden as most of the information learnt is essential for building strong foundation in future clinical years. Preclinical subjects are the

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alphabets on which a strong clinical study can be designed. Every student need to master preclinical subjects and most of the time because of heavy curriculum, it is very difficult to remember the factual knowledge. Since most of the students are in a period of transition from high school to University, find difficult to cope with the heavy curriculum and difficult medical vocabulary. Medical words which to be studied and memorized from subjects such as Anatomy, Physiology etc., are difficult in addition to learning the anatomical structures, arrangements, relationship, blood and nerve supply, circuitous neural tracts and fibres. Learning and memory go hand in hand and most of the time student complains about their poor memory though learning is easier. Since both learning and memory are important factors in educational domain efforts to learn and memorize are constantly stressed in schools and Universities. Teaching is not telling students what we know but showing students how we learn (West, 1966). When teachers are successful, students will be enthusiastic, reflect, contemplate and engaging (Harmatti, 2000).

In such a system of learning, what is the solution to master the vast medical curriculum? A simple method of memory boosting can be adopted successfully to achieve a long term memory potentiation in education system without stressful long hour study. Hence the objective of the present study was to achieve a better learning tool to ease the stressful memorization task.

### **Methodology**

1. In this study a lesson from Anatomy and Physiology of Cranial Nerves was selected in an integrated system of medical curriculum from School of Medicine, UMS.
2. As a preliminary study, two groups of students, A & B, n=5 in each group were randomly selected by the random selection method and were instructed about the details of the study. Both groups of students were further selected based on similar intelligence scores which were tested by Raven's Progressive Matrices (advanced) IQ test. Both the groups were given one hour lecture on this

lesson and after the lecture, both groups were separated and provided with the power point lecture notes. 'A' group was asked to learn the subject as they wish mainly by their routine reading and memorization method whereas group 'B' was instructed to follow the innovative method of memorization designed by us. In the innovative method, we asked the students to develop two pictorial charts I, based on cranial nerves - mywebpages.comcast.net ([http://mywebpages.comcast.net/epollak/PSY255\\_pix/cranial\\_nerves\\_netter.JPG](http://mywebpages.comcast.net/epollak/PSY255_pix/cranial_nerves_netter.JPG)) and chart II with names of nerve, function and testing in a tabular form in a conference poster manner with sizes of 1 meter x 1 meter. Group 'B' students were instructed to hang these two Charts, - I & II in their hostel rooms right in front of their bed and visible clearly from their bed. Group 'B' students were instructed to glance through these two charts in their free time whenever they were relaxing or lying down in their free time. Both the groups were blinded from each other group and were told that, they shall be having a class test on Anatomy and Physiology of Cranial Nerves lesson after a week. Multiple choice questions (MCQ) and short essay questions with illustration on origin and termination, functions and testing were given to both the groups with a 5 minute standardized viva-voce questions. Examination papers were marked and their viva-voce examination results were evaluated. All the marks were totalled viz, MCQ, short essay and viva-voce and the average for each student was calculated and further, average of 5 students were calculated and analyzed.

3. Statistics used: Non parametric tests- Spearman correlation test followed by Kulnigorov Smirnov two sample test to test the difference.

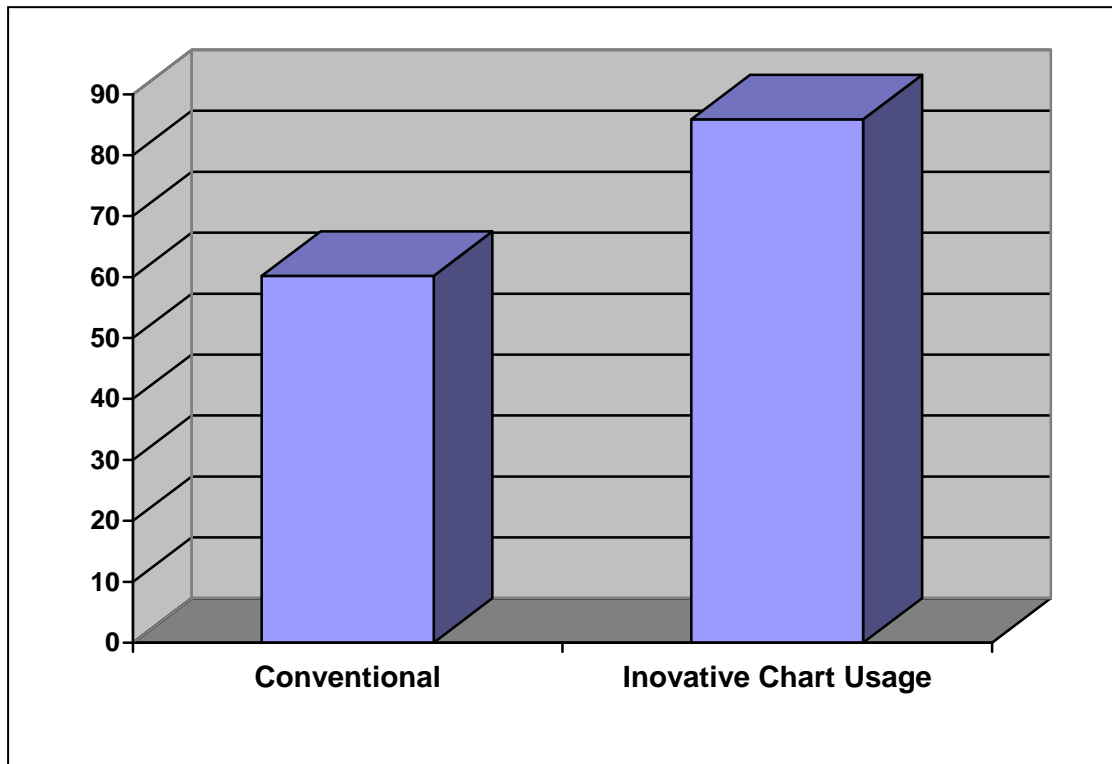
### **Results**

Both the group results were evaluated. In group B, students had scored much higher marks than the group A ( $P < 0.05$ ). In group A, 3 students scored below average marks both in MCQ and short essay questions. In standardized viva-voce examination, group B excelled very well and their level of understanding and command on the subject

was very much higher than group A. Examination scores were much higher in the group which used these flip charts

(about 25 to 30% higher than conventional group (Figure 1).

**Figure 1: Post test examination scores in conventional (group A) and innovative memorization(group B) learning methods.**



**Chart 2: Names of Nerves, Function & Testing**

| Nerve                         | Function                                 | How to test                                  |
|-------------------------------|--|--|
| I <b>Olfactory</b>            | olfaction                                | with an odorous substance                    |
| II <b>Optic</b>               | vision                                   | vision chart                                 |
| III <b>Oculomotor</b>         | most eye muscles                         | "follow the moving finger"                   |
| IV <b>Trochlear</b>           | superior oblique                         | look down at the nose                        |
| V <b>Trigeminal</b>           | facial sensation                         | touch the face                               |
|                               | muscles of mastication                   | clench the teeth                             |
| VI <b>Abducens</b>            | lateral rectus                           | look to the side                             |
| VII <b>Facial</b>             | facial expression                        | smile, raise the eyebrows                    |
|                               | taste                                    | sugar or salt                                |
| VIII <b>VestibuloCochlear</b> | hearing                                  | a tuning fork                                |
|                               | balance                                  | look for vertigo                             |
| IX <b>Glossopharyngeal</b>    | pharynx sensation                        | gag reflex                                   |
| X <b>Vagus</b>                | muscles of larynx and pharynx, parasymp. | check for hoarseness, open wide and say "AH" |
| XI <b>Spinal Accessory</b>    | Trapezius and sternocleidomastoid        | test shoulder raise or turning the head      |
| XII <b>Hypoglossal</b>        | tongue muscles                           | stick out the tongue                         |

### Discussion

Factual information is short lived and most of the factual knowledge is learnt in the class room lecture teaching method. Miller (1962) reported that, student forget much of Anatomy and Biochemistry before they graduate from the school, and many of the top scoring students knew no more of a subject than the average students and very low retention of basic medical subject information by the time they are in year 4. In group A student memorized the factual information learned during the lecture and later memorized from the lecture notes. Further, to add to this trend Richardson reported that, compared to new students, experienced students who completed an elementary physiology course did not have a greater knowledge level of physiology or perform better in a upper-division

physiology course, a prior course in physiology did not enhance performance on a pre-course or post-course test (Richardson, 1993) as most of the time learning method is memorizing the lecture notes without its impact on converting short memory into a permanent memory during day to day activity by means of simple reinforcement tools. In group B, the factual information from the lecture was exhibited in two charts and placed in front of student relaxing place specially their bed room sleeping area and were asked to glance through with an intention of reinforcing the information without stressful act of reading. Repeated regular glancing effect was successful in reinforcing the important message which was presented in the form of illustration. Science-based undergraduate education also did not show any effect on academic

performance by medical students (Hall & Stocks, 1995) and retention of acquired knowledge is short lived (Cortrite, 2003). Student of group B, expressed better satisfaction and felt that this innovative method in learning and memory had a better impact since most of the students were new to the English medium of University medical course with a background of either Bahasa Melayu or Chinese High School teaching medium. Much of what lecturers teach in a class room with large numbers of students conflicts with the goals of teaching and not prepare the students for solving any novel problems as most of lecture teaching only encourages memorization of information. Retention of this knowledge acquired is short lived and student grades generally do not correlate with problem solving abilities (Cortrite, 2005). This innovative method could help them to get hold on the difficult words both in spelling and vocabulary. Since this is a preliminary study, we are expanding this innovative method to a bigger student population group and gauging the statistical level for a better scientific approval to test its viability. In a preliminary round our observation is that, this method can be successfully adopted in every educational programme and student can be successful in their difficult task of learning and memory as memorization contributes its major share in acquiring the knowledge.

## Conclusion

Reinforcement of factual information during odd times such as resting or relaxing time in the form of concise chart helped in a better way of learning without stress and helps the memorization task easier.

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