A Study on The Effectiveness of Teaching High School Mathematics Using Memory Aids

S.Rajendran, J.Sengamala Selvi, T.Venugopal

Abstract: ***Mathematics is no longer a difficult subject for school children if they are able to identify their area of weakness that is the common errors. To address these type of problems and trying to find a solution is the area of research. In addition to this, introduction some memory aids for students to remember formulas, results etc., will be the next area to research moreover in competitive examination , to answer objectives type questions., shortcut methods are much useful. Having served as a teacher over two decades in Schools it has been succeeded in teaching mathematics effectively to various levels of students using various techniques from conventional ones to innovative ones. Especially taught with Memory Aids - Mnemonics – Acronyms in particular and it has been observed that this enhanced the understanding capabilities of the students. The purpose of the study is to find out how ICT is perceived by non ICT teachers in the schools that offer ICT. This paper discuss in this area would certainly be a contribution to the teaching fraternity.***

Keywords: Acronyms, Memory Aids, Mnemonics, Mathematics, Non-ICT

I. INTRODUCTION

Non ICT method is a technique which already exists in the field of teaching and learning, thus requires no formal introduction! Teachers can't be replaced by technology! The chalk and talk method is the basis but it requires small changes according to the present generation of learners. To learn mathematics in a successful way we adopt various techniques which require only attention and interest of the learner. Learning Mathematics using non ICT techniques is more like learning cycling which once stored in the mind never requires revision! Using some shortcut methods, mind mapping techniques, observing the pattern to remember formulas of certain concept, definitions are few examples of Non ICT methods.

ICT way of learning requires electronic gadgets which are not allowed normally inside the examination hall but non ICT methods! Mnemonics, acronyms are used in a big way under Non ICT methods. These methods are widely used to solve problems within the given time in competitive examinations like JEE, UCEED, NID, etc. Techniques like *Vedic* Mathematics are nowadays very popular among student community. Vedic Math techniques are mainly used in calculations to save time and to avoid errors.

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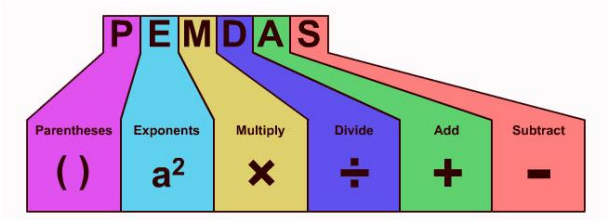


Objectives of the study:

Having served as the teacher over two decades in Schools have succeeded in teaching Mathematics effectively to various levels of students using various techniques from conventional ones to innovative ones. Especially have taught with Memory Aids - Mnemonics – Acronyms in particular and it observed that this enhanced the understanding capabilities of the students. Objectives of Non-ICT is

- Many studies have been carried out on teaching Mathematics through ICT / software
- When many schools and many children in India do not have computer facilities devising a model to teach mathematics using "NON-ICT" Methods – Memory Aids, for example, is in placeMany books address "Memory Aids" giving some examples – A holistic approach is missing - almost no study on this topic.

There are various strategies of Teaching Mathematics like

- Strategies for Vocabulary Development
- Strategies for Using Manipulative
- Strategies for Teaching Procedures
- Strategies for Understanding Problem Solving
- Strategies for Using Mathematical Games

Acronyms

Acronyms are words that are formed by the first letters of each of the parts of a compound term or phrase. These mnemonic devices can help students remember the steps or components of the procedures being taught.

Mnemonics

A memory aids, something that strengthens the memory in a verse or an amusing saying. Particularly useful in remembering mathematical identities, formulae or constants.

Research Methodology

- Collecting all relevant memory aids from literature and / or designing our own memory aids with a theme in mind – High School Mathematics

- Experimenting various topics with different groups of students with a pretest and post test
- Analyzing the results using statistical packages to find out the degree of effectiveness of teaching Mathematics through memory aids
- The contents of the thesis can later be published as a text book on "Proven MemoryAids for TeachingMathematics at High School Level for the benefit of the society.

Illustrations

Few illustrations are discussed below.

SOME SHORTCUTS

For Better Performance In School Examinations

Middle Term In Binomial Expansion: -

- In the expansion $(a + b)^n$
- The middle term (if n is even) $= (\frac{n+2}{2})^{th}$ term.
- The middle term (if n is odd) $=(\frac{n+1}{2})^{th}$ term.

Constant Term In Binomial Expansion:-

- In a binomial expansion, like $(ax^p + bx^q)^n$
- Constant term = $\frac{n.p}{p-q} + 1$

r^{th} Term In Binomial Expansion:-

- In expansion of $(a+b)^n$
- r^{th} term from the last (end) is $(n-r+2)^{th}$ term from the beginning.

Value of Π (the first few digits)

The value of Π = 3.14159

The numbers of the letters in each word gives the digits of pi

Now I Wish a Happy Deepavali!

To remember Definitions of Trigonometric Ratios (O – opposite side, A-adjacent side, H-hypotenuse)

$$Sin\theta = \frac{O}{H}\ Cos\theta = \frac{A}{H}\ Tan\theta = \frac{O}{A}$$

The above formula can be remembered as follows:

SOH-CAH-TOA

Using Mnemonics, it can be written as:

Son Of Hero Caught And Hit The Office Assistant

Parabola

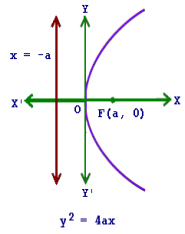
I. $y^2 = 4a (+ x)$;

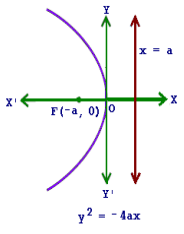
LHS: Y power 2 means, ± both sides of Y

RHS: +x : the +ve side of x – axis.

II. $y^2 = 4a (- x)$;

RHS: x: the – ve side of x





y^2 – b oth sides of y

III. $x^2 = 4a (+y)$

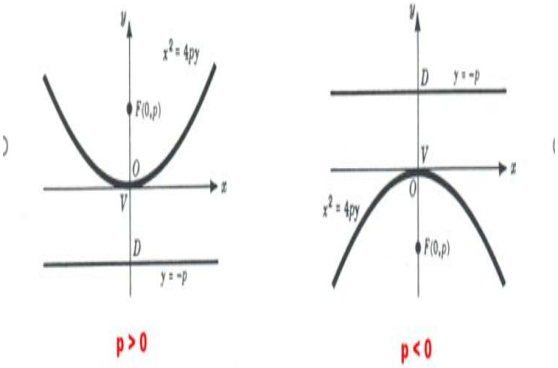
x^2 – both sides of y

+y = +ve sides of y

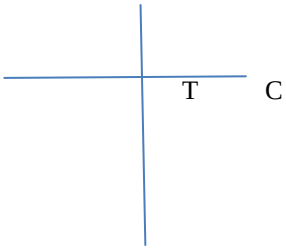
IV. $x^2 = 4a (-y)$

x^2 – both sides

-y - -ve sides of y



7. Trigonometry



Sarah Tucker College – a famous college in Tirunelveli

A-all trigonometric ratios are positive in first quadrant.

S- sine is positive in second quadrant

T-tangent is positive in third quadrant

C-cosine is positive in fourth quadrant

To avoid common errors in trigonometric ratios, the teacher can insist the following

If you write Sin without 'theta' it is 'Sin'

If you write Cos without 'theta', there is no 'cause'

Complementary Angles:

1. 0 + 90 = 90 (0,90) or (90,0)

$$\sin 90^\circ = \cos 0^\circ$$
$$\cos 90^\circ = \sin 0^\circ$$

2. 30 +60=90 (30,60) or 60,30)

$\sin 30^\circ = \cos 60^\circ$

$\sin 60^\circ = \cos 30^\circ$

3. 45 + 45 = 90 (45,45)

$\sin 45^\circ = \cos 45^\circ$

To find the area of the square using its diagonal

Given:

Diagonal 'd' units

To find:

Area of the square

Area of the square with diagonal 'd' units = half of the square of the diagonal

$A = d^2/2$ sq. units

Middle Term

. Representing 0.7 7…in p/q form

let ,x =0.7

10x=7.7

=7+x

9x=7

X=7/9

Therefore from the above examples 0.a.. =a/9

Similarly, 0.35=35/99this implies 0.ab= a b/99

Volume of 3D shapes

➢ If the height of the cylinder is equal to the diameter of the sphere, then the volume remaining is half the volume of the sphere immersed.

To find LCM and HCF

Step 1: factorize

Step 2:

LCM-common terms (**Highest** power)&uncommon terms(not ignored)

(multiply)

HCF-common terms (**Least** power) &uncommon terms (ignored)

Metric Measures

Kilo Metre1000

Hecta Metre100

DecaMetre 10

Metre 0

DeciMetre .01

CentiMetre .001

MilliMetre .0001

To remember the above one can form a phrase

King Haider Doesn't Mind Drinking Cold Milk

CONCLUSION

The student community can develop parallel phrases or mnemonics and other memory aids with the motivation discussed above.

The benefits are:

- Influence of Memory aids for better performance in school examinations
- Support of Memory aids for getting an edge in entrance examinations like IIT JEE
- Minimizing common errors committed by school students in Mathematics

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