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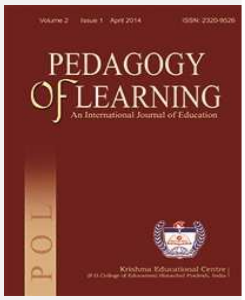

Developing Multiplication Skills using Vedic Aphorisms Embedded with Multimedia

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Abstract
The promising development of humankind is reflected in the education system of any nation. The progress of society is the mirror of investments in the education of young generations. To the best of the knowledge of the authors, the pedagogy used by teachers in our country is still dominated by the conventional system. Contemporary nations leave no stone unturned to build a mathematically literate society to compete with the advancements of the new technological era. Therefore, it is the need of the hour to reframe pedagogy with modern techniques. The change can be brought by integrating technology in the present system of imparting instructions in the classroom of mathematics. The abstractness of mathematics makes it hard for the students to understand the concepts and do calculations with an ease. Teaching through multimedia integrated with technology brings out the best in the child. The combination of multimedia with Vedic mathematics will help students to do smart work. Through amazingly easy methods of Vedic Mathematics, students can solve complex problems with relative ease. Vedic mathematics through multimedia can help the students to develop their mathematical skills too. This paper is an attempt to bring technology and Vedic aphorisms in the pedagogy of mathematics for the development of multiplication skill of mathematics.

Keywords: Multiplication Skills, Vedic Aphorisms, Multimedia

The purpose of education is to develop wholeness in the life of the learner. An ideal education should strengthen and integrate the physical, mental, and behavioral aspects of life by developing their common basis and pure consciousness. The world of today is witnessing acceleration in all fields of knowledge. The era of technology led to the obvious changes in all aspects of life. There is a need of an education system that could respond to these changes and attempt to put the principles and criteria for the selection of teaching methods appropriate for today's technology oriented era. The technology provides support to educational process as well as to the teacher in giving instruction to students. The modern education must be compatible with the changes that are occurring where the cognitive abilities and skills of learners can be developed, which are difficult to be developed by the conventional teaching methods (Layous, 2011). In the field of Education, multimedia has established itself as the most interesting method of exchanging information with the students and it has been proved through research in past few decades. The basic reason behind the use of wide range of multimedia in education is that it allows visual explanation of ideas, concepts and abstract items. Consequently, results of work with students explored that they became interested in variety of multimedia methods of instructions including different kind of educational software and use of cyberspace.

Numerous researches taken place in the field of mathematics ensure that learning becomes effortless with the use of multimedia. Mathematics is a subject pre-requisite of which is not to adopt too much knowledge and information. Students repeatedly come to the solution of the problems mechanically following the algorithm steps without real consciousness of their actual meaning (Bishop, 1989, Zimmerman & Cunningham, 1999). One of the main aims in modern approach in teaching is also the knowledge transfer by giving the facts and explaining the relations between them. Visualized lectures are extremely helpful in the learning abstractness of mathematical concepts. This is the main reason that teachers emphasize and take interest in the use of multimedia. Modern methods in multimedia approach to learning include the whole range of different possibilities applicable in mathematics lectures for different levels of education and with different levels of interactivities (Herseg & Herseg, 2009). Use of multimedia in teaching mathematics is an idea of making use of applicative software in a manner that would be helpful in a modern and more interesting approach to the field of teaching mathematics and raising the students' knowledge to a higher level.

Although conventional teaching may prove to be thought-provoking depending upon the competencies of the teacher, preferences of students lean towards the use of multimedia in learning of mathematics because it provides step by step procedure through animations which makes it relatively easier for the students to comprehend and to follow without much effort to make the subject fascinating. (Milovanovic et. al., 2011). Multimedia not only consists of video clips, texts, animations and images but can be made interactive too which will have a significantly improved effect on the learning of students (Sikos et al., 2009). Mathematics as a subject in itself seems unfamiliar to students causing a sense of phobia for the subject as they feel no relationship of the subject in their daily lives as well as with others subjects under study (Boaler, 2000). Mathematics is a subject of visualizations and students learning can be made better if mathematical concepts and procedures are presented to students in the form of visuals. It will be even better if students can interact with the

presented visuals to explore the beauty of subject on their own. Multimedia is able to give these types of visualizations to the students in this subject.

National Council of Teachers of Mathematics (2000) underlines the use of multimedia technologies for providing quality mathematics education in classroom. It can work as an essential and important tool for providing access to mathematical education to all students. It also helps students in developing reasoning and sense making by using technology for computation, construction and explore problems. Multimedia improves students' math learning and cognitive process (Liu, 2011). Multimedia packages in teaching/learning of mathematics for elementary students are far better, effective and joyful. Leaning of students in mathematics at secondary level progressed by using multimedia package as compared to the conventional methods for mathematics achievements (Kannan, 2015). Multimedia also proves its effectiveness on only at secondary school level but at almost every level of education. It is a melody sung in synchronization with multi-frequency and multi-modal bits of knowledge and creation. To inform, educate and/or entertain are the ultimate goals of multimedia. It is all-pervading, inspiring and connecting method of instruction which teaches mathematics along with entertainment and interaction with multiple surfaces (Malik & Aggarwal, 2012). In past few decades, learning through multimedia has become utmost importance and of interest of stakeholders in the field of education. Multimedia consists of different types of animations, images, audios and videos, which open up the wider spectrum of opportunities and possibilities in learning mathematics. Instructions provided through multimedia also enable flexibility of learners to adapt to individualized learning strategy (Neo, 2007). Tools of multimedia such as videos, audio, animations and images used for giving instructions to students in mathematical class allow an easier understanding of mathematical concepts (Wishart, 2000). Multimedia has enormous potential to impart flexible, multi-modal, life-long education to diverse mass learners (Malik & Agarwal, 2012). To impart life-long education to diverse mass learners of mathematics, multimedia plays a significant role as it has enormous, flexible and multimodal potential (Malik & Agarwal, 2012). However, there is a need of assessment of the efficiency of use of new multimedia tools in classroom setting in the light of their influence in the teaching-learning process. (Krippel, *et. al.,* 2010).

Vedic mathematics is the name given to ancient Indian mathematics system. According to research, all of mathematics is based on 16 sutras also known as aphorisms given in Vedic mathematics. The whole system of Vedic mathematics is beautifully interrelated and unified because the most important feature of Vedic mathematics is coherence. This unique quality is practically satisfying as it makes learning of mathematics easy and pleasurable. Vedic Mathematics offers an entirely different approach to mathematics. It can help overcome math anxiety being faced by many students in mathematics class. Through its amazingly easy methods, students can sharpen Mathematical skills and can solve complex problems with relative ease. Vedic Mathematics is beneficial for the students in improving skills in mathematics. It enables faster calculation when compared to the conventional method. Thus, the time that gets saved in the process of tedious calculations can be used to answer next questions. Vedic Mathematics saves time during examination (Jiji, 2013). The experience of teaching methods of Vedic Mathematics to children has shown that a high degree of mathematical ability can be achieved from an initial stage while the subject is enjoyed for its own advantages (Glover, 2002). The system has

great educational value because the Sutras encompass techniques for performing most but not all elementary mathematical operations in entirely simple ways, and results are gained quickly (Gupta & Kapoor, 2005). Vedic Mathematics can be used to remove math phobia and can be taught to school children as enrichment material along with other high-speed methods.

The combination of multimedia with Vedic mathematics will help students to do smart work. Through amazingly easy methods of Vedic Mathematics, students can solve complex problems with relative ease. Vedic mathematics through multimedia can help the students to develop their mathematical skills. In this paper the investigator has prepared a power point presentation on the topic of multiplication for elementary classes. The vedic sutra used is 'Nikhilam' which is also termed as "all from nine and last from ten' which further means subtract the last digit of the given number from 10 and all other digits from 9. Multiplication of single digit numbers, two-digit numbers and three- digit numbers are included in the presentation. Further the application-based problems can be solved using Nikhilam. The purpose of combining Microsoft power point with Vedic mathematics is to enable students to use multiple senses to learn multiplication that too through relatively easy methods to solve cumbersome calculations. The slides of power-point presentations have been given in the appendix for reference. The paper is an attempt of combining PowerPoint animations and vedic techniques for multiplication.

Step by step presentation of multiplication using 'Nikhilam Sutra' can help students to learn and acquire a new technique to solve relatively tough and time-consuming questions of multiplication which has been described in the following paragraphs.

The vedic sutra which has been used in preparing the PowerPoint presentation for teaching multiplication skill is Nikhilam Sutra which literally means "All form nine and last from ten". Which further means "subtract the last digit of the given number from 10 and all other digits from 9. Also, for doing multiplication using Nikhilam sutra, a base number is needed. A base is a number that is multiple of 10 may be 10, 100, 1000 and so on depending upon the numbers to be multiplied. Investigator took an example of multiplying 9 by 8 which is single digit multiplication. Take the base 10, nearest to the numbers to be multiplied as 10 is the nearest base in the case of 9 and 8. Subtract each of them from the base (10) and write the remainders on the right side with a connecting minus (-) sign. Both **8 and 9** are **less than base 10**. Therefore, a connecting minus sign (-) has been used here. The answer will have two parts. The left part and the right part are separated by a slash (/). For the left part of the answer, cross subtraction is being done by subtracting 2 from 9 (9-2) or 1 from eight (8-1), to get **9-2 = 7 or 8 – 1 = 7.** For the right side of the answer, vertically multiply the right-side digits 1 x 2 = 2. Therefore, the answer is 72.

Base 10
9 – 1
8 – 2
---
7 / 2

In the same manner, multiplication of 7 and 8 has been done as shown.

Base 10
7 – 3
8 – 2
---
5 / 6

In the above examples, the right-hand side of the answer gives a single digit number, but if the right side of the, answer is a two-digit number, then, left digit of the two-digit number on the right side of the answer is carry forward to the left side of the answer to get the final answer 42 as shown below.

Base 10
7 – 3
6 – 4
---
3 /$_1$2

4/ 2

Now, Multiplication of two-digit numbers has been shown below using Nikhilam. In this type of multiplication, 100 acts as base as there are two digits in the numbers to b multiplied, so base number must contain two zeros. Then, take the difference of 93 and 92 by 100 (as shown). 100 – 93 is 7 and is written on right side. 100 – 92 is 8 and is written just below 7. Put 93 and 92 above and below (as shown). Multiply 7 by 8 and you will get 56 for the right part of the answer. Cross subtract 93 – 8 or 92 – 7 which 85; the left part of the answer. The final answer is 8556.

Base 100
93 – 7
92 – 8
---
85 / 56

Now, multiply 13 by 8. Here the base 10. The number 13 is three more than the base 10 and 8 is 2 less than the base 10. Write 13 with a connecting plus (+) sign. Calculations will be done (as shown). To get the answer, take away 1 from the right most digit; 1-1=0. For the right most, part use Nikhilam (all from 9 and last from 10 and get 10-6 =4. The final answer is 104.

Base 10
13 + 3
8 – 2
---
11 / - 6

104

In the same way, bigger numbers can be multiplied by taking the appropriate base as shown below. The multiplication of numbers 888 and 998 has become comparatively easy to conventional methods.

Base 1000
888 – 112
998 – 002
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886 / 224

Even the multiplication of six-digit numbers (say 999989 × 999998) is also carried out with relative ease using Nikhilam Aphorism of vedic mathematics, as described below to get answer as 999,987,000,022.

Base 1,000,000
999989 – 000011
999998 - 000002

999987 / 000022

To conclude, multimedia is the new frontier of integrating technology into mathematics education. The authors have presented an approach to teach mathematics courses by integrating meaningful multimedia technology to foster the learning process especially in elementary mathematics for multiplication, which may help students to learn the subject with interest. This paper focuses on integration of multimedia-based teaching approach into multiplication skill through Vedic mathematics, which has the impact on student's performance and their attitudes toward development of mathematical skill. The screen shots of PowerPoint presentation have been presented in appendix at the end of this paper for reference.

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