Sampreshan
UGC CARE GROUP 1
https://sampreshan.info/
Vol. 17, Issue No. 1, March 2024
ISSN: 2347-2979

ENHANCING THE UNDERSTANDING OF MULTIPLICATION AMONG CLASS V STUDENTS OF PANCHAYAT MIDDLE SCHOOL, PILAIYARPALAYAM, KANCHIPURAM

C Brintha [1] & T Arun Christopher [2]

[1] Senior lecturer, DIET, Kanchipuram District, Tamil Nadu – 604601
Email: brintha.maths@gmail.com

[2] Assistant Professor, School of Education, Central University of Kashmir, Jammu & Kashmir
Email: arun.tacde@gmail.com

ABSTRACT

This report examines the impact of action research technique on the teaching and learning process, as well as professional teacher development. This study includes 23 pupils from class V, as well as their professors and a researcher. Teaching multiplication consists of two components. The initial stage is concept learning. The purpose is for students to comprehend the meanings of multiplication. During this phase, students use a multi-sensory approach to focus on behaviors related to multiplication concepts (e.g., "groups of", "equal parts", "building arrays"). Fact methods, the second step, are a vital educational bridge that is sometimes overlooked between concept learning and memorization. There are two objectives in this phase. First, students must grasp that there are clusters of multiplication and division facts that relate in specific ways. Second, students must comprehend these relationships. These courses are mostly intended to aid with the second portion of the procedure. The teacher agreed to cooperate and jointly plan the learning activities, to observe their students systematically, and to reflect on the outcomes in order to use a multi-sensory approach to teaching multiplication in the fifth grade of Panchayat Union Middle School, Pillaiyarpalayam, Kanchipuram. This method of conducting research in their classes allowed them to 'act' successfully in constructing an action plan based on the students' achievement level. This study was conducted between February 18 and April 31, using a variety of methodologies, including classroom observation, conversations, demonstrations, and worksheets. The findings reveal that both girls' and boys' performance in multiplication improved significantly following the interventions. According to the study, teachers should prioritize idea creation over syllabus completion and devote the necessary time to improving students' conceptualization through a multi-sensory approach.

Keywords: Action research; multiplication; addition; sharing and middle school students

ISSN: 2347-2979

INTRODUCTION

Arithmetic is a name for working with numbers. The four basic arithmetic operations are addition, subtraction, multiplication, and division. Harder arithmetic includes working with signed numbers, fractions, and decimals, and taking powers and roots. One of the basic arithmetic operations is multiplication. Essentially, to multiply numbers is to add groups of a number. Multiplying means repeated addition of the same number. Multiplication requires analytical, systematic and logical implementation of the data. Multiplication fact fluency is an essential ability for students to develop as they progress throughout elementary school, specifically with estimation skills and operations with larger numbers (Everyday Mathematics, 2002). While some students are proficient with fact recall, others often struggle throughout high school. In order to adequately prepare students for more difficult mathematical concepts during elementary grade and high school, every student must become proficient with mathematical fact recall (Wallace & Gurganus, 2005). To attain the said purpose, teachers of Mathematics should find innovative ways to improve the learning capabilities among the pupils, identify and remedy weaknesses, and provide the learners with experiences which can foster positive attitude to learn the rudiments of mathematical knowledge and skills.

Though it looks simple for adults, interestingly at times, class V student's conceptualization of multiplication happens to be challenging experience particularly for students from government school and it is even more challenging for students from rural background or area. When I saw students making mistake in multiplication in Panchayat Union Middle School, Pillaiyarpalayam, Kanchipuram, I could instantly comprehend the severity of the challenge that students were facing with multiplication. Hence Action research was initiated to identify the conceptual flaws of understanding multiplication and thereby implement special and corrective measures to develop suitable appropriate abilities to carry out multiplication on their own. Furthermore, the pupils should be made to realize that Multiplication facts are useful by making them see its application. Pupils need to be motivated and directed to appreciate Multiplication facts by making them realize that it is, and will always be a part of their lives. On the whole, it encourages learners to develop learner's cognitive and analytical skills by using simple activities and make learning meaningful experience for the learner.

CONTEXT AND RATIONAL OF THE STUDY

In the classical period of Indian mathematics (400 AD to 1200 AD), important contributions were made by scholars like Aryabhata, Brahmagupta, Bhaskara II, and Varāhamihira. The decimal number system in use today was first recorded in Indian mathematics showing the association of Indians in Mathematics. Though Indians are considered efficient in terms of analytical and numerical abilities, in a Programme for International Student Assessment (PISA), Indian students have performed below par when compared in the global arena. This is not accidental, but a serious reflection on the mathematical teaching and weak conceptualization of the students particularly about mathematics. The reason attributed to poor cognition and concept formation at the initial

ISSN: 2347-2979

stages. Being a teacher educator in Mathematics, it is important to strengthen basic skills and concepts in mathematics so that students do not feel uncomfortable when they reach higher classes. So I felt it is necessary to identify, analyse and work on new and effective strategies to formulate their understanding of multiplication. The curricular expectation is for students to be able to use knowledge and apply them at different learning situations.

Research Related to Early Teaching and Learning of Multiplication and Division

Several researchers have studied how young students multiply and divide. Nunes and Bryant (1996) indicated that a general point of view about multiplication and division is that they simply 'are inverse arithmetical operations that are taught after addition and subtraction' (p. 144). However, they stress that such a viewpoint is incomplete knowing the fact that "multiplication represent a significant qualitative change in children's thinking".

The first confrontation of students with multiplication is usually accompanied with situations that include sets with equal number of objects Greer (1992). Although there are other models available that represent multiplication, the model of equal sets (repeated addition) is known as a basic intuitive model for multiplication. A challenge in this situation is the child's reflection on the 'set' as a unit and the addition of those „units". In such a case, different expressions are used, such as '3 times 5', '3 multiplied with 5' or '3 with 5 each'. In their study, Gray and Tall (1994) noted that some children are not able to apply repeated addition to find out the product of two numbers. Thus, for instance, they can add 5+5=10, but then they continue to count 11, 12,..15 in order to get to know how much is 3x5. Consequently, a precondition to teach children how to multiply is to teach them first to do repeated addition. Since multiplication is the addition of 'many times' of equal sets it creates some problem when understanding division also. Understanding multiplication and division as a repeated addition and subtraction represents a future challenge. On the other hand, word problems not only serve as a basis for understanding children's strategies for solving addition, subtraction, multiplication, and division problems, they also can provide a unifying framework for thinking about problem solving in their daily life (Carpenter et.al., 1999). A child's thinking and their reasoning is important parts of the problem solving process (Barmby, (2009). Using practical experiences of children themselves and linking those with informal calculation strategies helps children count easier and clearly see the connections between the concepts and their application in problems solving.

IDENTIFICATION OF THE PROBLEM

The investigator noticed students of class V were finding difficulty in performing simple mathematical operation of multiplication. Lack of conceptualization about the basics arithmetic operations was evident which even made them feel insecure. On further probing by the investigator, it was noted that many had difficulty in performing simple single and double digit multiplication. This stimulated the investigator to find a solution to the problem. Therefore, to enhance class V understanding and skills on multiplication this action research was initiated.

ISSN: 2347-2979

AIM AND RESEARCH QUESTIONS

The aim of this study was to investigate the ways of teaching and learning activities which enable students to use their experiences, consider different ways of calculation and justify problem solving related to basic multiplication. There are two phases in reaching the goal of this research; the first phase is **concept learning**. Here, the goal is for students to understand the meanings of multiplication. In this phase, students focus on actions that relate to multiplication concepts. An important instructional bridge that is often neglected between concept learning and memorization is the second phase, **fact strategies**. There are two goals in this phase. First, students need to recognize there are clusters of multiplication facts that relate in certain ways. Second, students need to understand those relationships. These lessons are designed to assist predominantly with the second phase of this process.

OBJECTIVES OF THE STUDY

Objectives are the aims of any research work. The action research has been designed with the following objectives: Students will

1. To identify basic arithmetic operations.
2. To gain familiarity with symbols and its meanings of basic arithmetic operations (mathematical facts).
3. To compare the similarities between addition and multiplication.
4. To compare the relation between subtraction and division.
5. To compute single digit and double digit multiplication with ease and confidence.
6. To gain knowledge and skills in performing arithmetic operation of multiplication.
7. To develop interest and skills in performing basic arithmetic operations.
8. To strengthen mathematical aptitude
   AND
9. To enhance the overall scholastic and research abilities of the investigator.

METHOD OF RESEARCH

According to the "Mathematics Education Research Journal," the ability to master basic mathematical computations is the key to success with higher level math problems. The main purpose of the research is to actively improve practice of mathematics teaching on the basis of ideal position of good model of secondary mathematics teaching and on the basis of assumption that the teacher can learn and create knowledge through his/her concrete experience and observing and reflecting on that experience. The striking benefits of the research therefore are that understanding of the teacher and the situation of teaching learning processes is to be improved so that students get benefited as well as to orient students properly towards mathematics learning. Teacher is perceived to be co-worker in doing research and the researcher is not considered to an outside expert. Thus, the approach of the research is an evaluative-reflective participatory-critical collaborative enquiry of teaching. The process of action research includes problem analysis and a

ISSN: 2347-2979

strategic plan, implementation of a strategic plan, observation and evaluation of the action by appropriate methods and techniques, reflection on the results of the evaluation and on the whole action and research process.

PLAN OF ACTION & IMPLEMENTATION

As the investigator proposed to find out the solution, the Action plan was made, which consisted of different stages.The research covers the following action (Zuber and Skerrit, 1992) : (1) identifying and analyzing problems arising in mathematics teaching learning processes, (2) designing the strategies for solving the problems as a results of symmetrical communication among the researchers and the teacher, (3) implementing and testing the strategies, (4) evaluating the effectiveness of the strategies, (5) reflecting the results, (6) arriving at conclusion They are as follows,

A. SELECTION OF SAMPLE

24 students of class V of *Panchayat Union Middle School*, *Pilaiyarpalayam*, Kanchipuram, was part of the sample of the study. The sample constitutes 15 boys and 09 were girls.

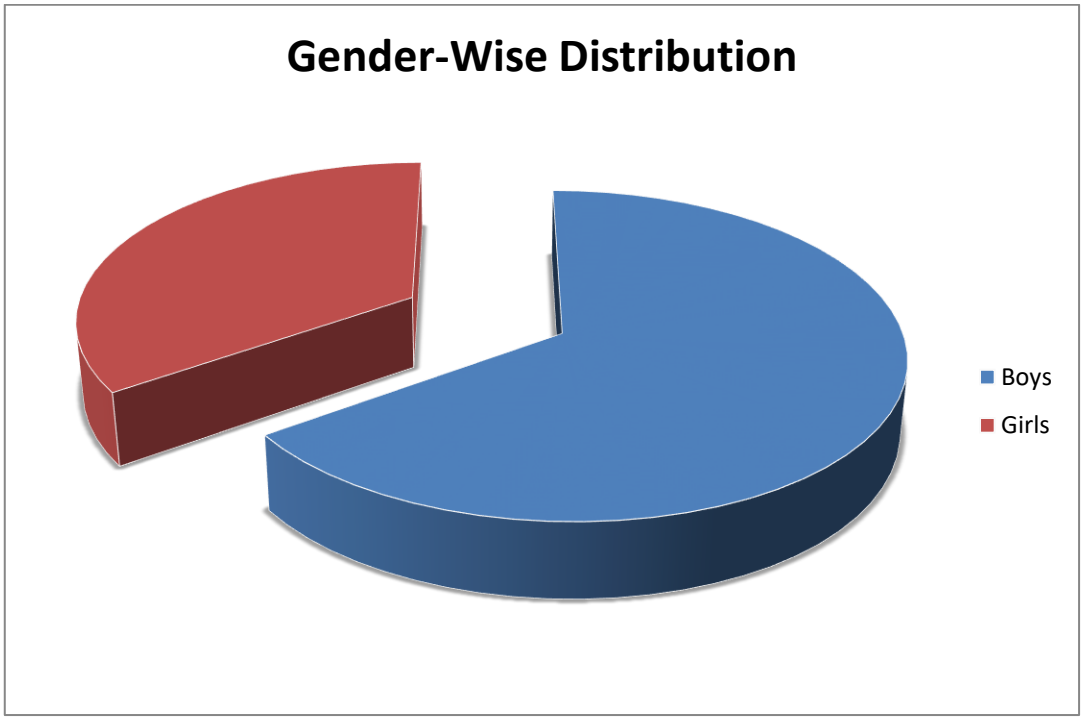

Figure 1shows the gender-wise distribution of sample

ISSN: 2347-2979

B.TESTING OF HYPOTHESES

Taking into account the above mentioned objectives following hypothesis were formulated

1. There exists no significant difference between the pre-test and post-test mean score of the Experimental Group where multiplication is taught through the traditional skills and blackboard method.

2. There exists significant difference between the pre-test and post-test mean score of Experimental Group where multiplication is taught through Situational approach.

C. CONDUCTION OF PRE-TEST: (Measuring Previous Knowledge)

As it was observed that the students were not having proper conceptualization on multiplication, it was decided by the investigator to teach it with learner centred strategies and activities using hands on experiences. To measure the previous knowledge and of the students, the investigator prepared per-test i.e. diagnostic Test which comprised of 9 items viz. Fill in the blank, choose the correct answer, short answer and brief answer type. This will give investigator, clarity about student's conceptualization of 'multiplication'. Furthermore, the diagnostic measure will help in planning the possible interventions as it helps the researcher to focus on the challenge and develop suitable remedies to address them effectively. Students were given proper guidelines to write their test without any hesitation and doubt.

Pre-test and finding: Pre-test was conducted on 24 students of class V. The results show clearly that many students are having poor conceptualization of multiplication process.

Pre-test was followed by developing suitable and appropriate strategies like planning for various activities involving multi-sensory approach as it can guide the learners in appropriate conceptualization of multiplication.

D. IMPLEMENTATION OF STRATEGIES

Strategy instruction allows the teacher to help the student develop strategies for solving multiplication problems and developing mathematics facts. Strategies such as paper pencil test, suitable amount of drill and practice to develop manipulative skills, activities to visualize the multiplication concept and make it more tangible were planned and implemented.

According to the "New York Times Magazine," research indicates that drills can be effective if used creatively or in tandem with other strategies. New strategies have emerged to help students master their multiplication facts. The goal is that, through repetition, the student will eventually be able to respond immediately and accurately without the assistance of the teacher.

So, suitable methodology to teach concepts will develop better understanding. In order to aid and strengthen students' cognition, multi-sensory approach enabled material on multiplication was developed. This researcher believes will help reformation of the thought process on the concept of multiplication in the appropriate manner. Furthermore, it will help in developing analytical, logical and perceptual skills which make learning simple and fruitful.

ISSN: 2347-2979

When I prepared to work on this objective, I wanted my student to meet the pre-defined curricular expectation. In order to achieve this, I choose this topic for Action Research as '*Enhancing the understanding of multiplication among V standard students'.*

E. STRATEGIES FOR LESSON PLANNING

1. Accomplishing the various needs of academic competencies:

a. to incorporate multi-sensory approach to teaching
b. to prepare suitable pre-test and post-test material.
c. to develop learning in group.
d. to guide individual student
e. to develop "work-sheet" for students
f. to enhance hands on experience in teaching and learning.
g. to develop sound understanding on the basics of arithmetic.
h. to develop interest in learning mathematics.
i. to develop interesting drill and practice interventions.

2. Encouraging the students to be active learners:

a. to develop and channelize students' cognition about the concept.
b. to develop proper understanding on mathematics facts.
c. to guide and assist students learning throughout the session.
d. to develop active participation of students.
e. to make learning experiences joyful and meaningful for the learner.
f. to develop learning in group and bring in variety into the classroom teaching.

F. TEACHING AND LEARNING SESSION

After analyzing the results of pre-test, the investigator exhaustively planned for teaching. The idea of multi-sensory approach enabled teaching was strongly felt and suitable resources were developed in this regard. The investigator also planned various activities for the entire teaching session so that student's conceptualization is rational. Careful and meticulous planning and implementation was a priority of the investigator and a class session was delivered. The session was interesting and lively more than the expectations of the investigator.

G. CONDUCTION OF POST-TEST

After re-teaching using modified strategies viz. Multi-sensory approach, and activity based teaching and learning with suitable drill and practice session, post-test was administered to measure the performance of the pupils which directly reflects on students' conceptualisation on multiplication and the effect of the strategies used by the investigator. The results were significantly positive.

ISSN: 2347-2979

ACTIVITIES PLANNED FOR ACTION RESEARCH

1: The Array Finder
2: Number Lines
3: Chain of Multiplies
4: Doubling Up Strategy
5: Time Delay Method
6: Count-By Method
7: Effective Drill and Practice – Partner practice
8: Handy Nines
9: Practice Fast Activity - Drill Vaddai's
10: Crack the Code
11: Using Napier bone/board
12: Learning using simple sticks

ANALYSIS OF THE DATA

The collected data were analysed by applying Mean and Average. The results are present in the following table 1. Marks scored in the Pre-test and Post-test sample are given below.

ISSN: 2347-2979

TABLE 1 - Sources of Pre-Test and Post-Test of the Students

S.NO	PRE-TEST	POST-TEST	PRE-TEST	POST-TEST
	BOYS		GIRLS	
1	7	93	20	87
2	20	93	27	100
3	20	80	33	100
4	20	100	63	100
5	57	97	30	80
6	47	100	7	93
7	37	93	7	47
8	13	100	7	50
9	40	100	13	100
10	40	100	--	--
11	37	93	--	--
12	37	100	--	--
13	37	100	--	--
14	27	100	--	--
15	20	87	--	--
Total (Overall)		643	2107	
Mean (Overall)		27.97	91.59	

From the table 1, it is understood that the mean value of the Pre-test is 27.97, but in the post test the mean value is **91.59**. The massive change is test scores is reflecting on the fact that proper conceptualisation of students will definitely serve the purpose of improvement in mathematic

ISSN: 2347-2979

operation of multiplication and on the overall improve higher achievement in mathematics among class v students. Hence care should be taken so that sufficient time is allotted to focus on developing basic concepts in mathematics among students.

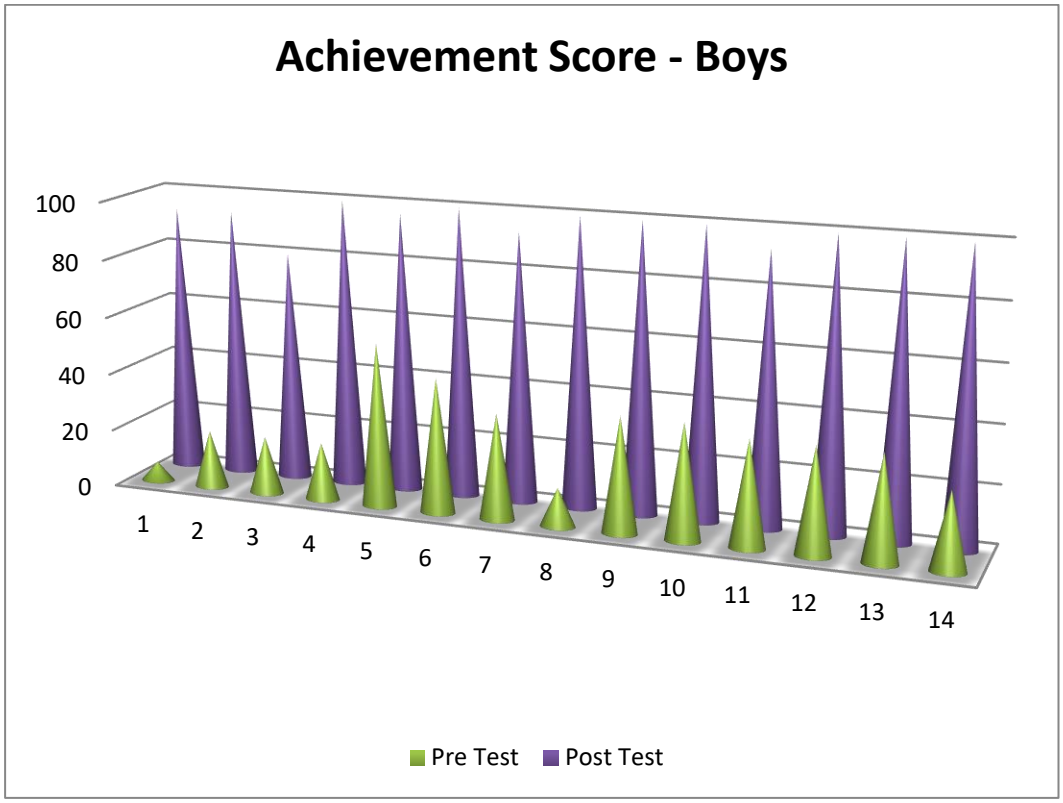

Figure 2 shows the mean comparison of Pre-test and Post-test scores of boys

ISSN: 2347-2979

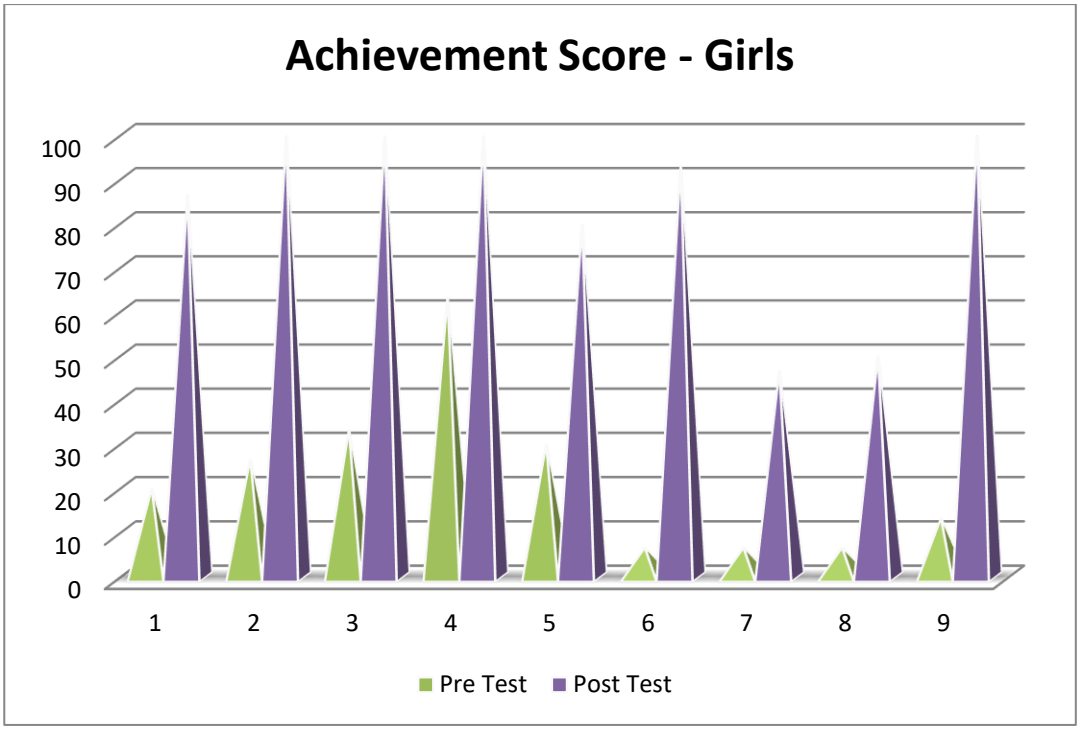

Figure 3 shows the mean comparison of Pre-test and Post-test scores of girls

The graphical representation of data shows total transformation in terms of performance reflecting on effective learning of the students. The change in strategy in the form of multi-sensory approach coupled with suitable drill and practice will certainly enhance the mathematics achievement among class V students. Hence the action research has given rich dividends to the learner in particular and as an eye-opener to teachers and all related stake holders.

FINDINGS OF THE STUDY

The following findings are inferred from the interpretations made through the analysis of the data. All the students, irrespective of their gender, have performed comparatively better in the post-test. Comparison of the pre-test and post-test shows that the post-test score of the students is observed to be higher than their pre-test score in understanding the concept.

1. The post-test score of the students is found to be higher than their pre-test score in exhibiting that it is the teaching methodology that needs to be modified.
2. Multi-sensory approach in the form of activities, games, and suitable and sufficient amount of drill and practice has huge impact in learning and this has to be adopted more consistently in the teaching and learning process.
3. Concept formation is the key to better learning. When the child is young their understanding of concepts will take some time but that should be priority in teaching and learning.

More focus should be given to methodology of teaching.

ISSN: 2347-2979

DISCUSSIONS ON THE FINDINGS

General picture of mathematics teaching prior the action research, reflected by the teacher, was that the teacher implements classical teaching method predominantly by exposition method in the cycle of explaining, questioning, and giving the students assignments. By such kind of teaching methods, the preliminary enquiry indicated that the teachers have difficulties in: (1) covering the various needs of academic competencies, (2) promoting student's active ways of learning, (3) developing technological resources for teaching.

"Today, mathematics is not about computation, especially pencil-and-paper computation. Mathematics is about reasoning and patterns and making sense of things. Mathematics is problem solving" (Van de Walle, 2004, p.176). Using practical examples and word problems enables children not only to improve their calculation skills, but also to understand the meaning of 'size' presented through those problems, which is very important for the development of the division concept in children (Fischbein at al., 1985; Mulligan, 1992; Gray and Tall, 1994). However, Vergnaud (1983) stated that multiplication, multipliers and product present different links of the 'factors' to the problems of division. According to this research, initial intuitive models were used to develop the concept of division as „sharing equally", while as a result of teaching, other models were developed, i.e. through „grouping" (Fischbein, et al.,1985; Mulligan, 1992; Murray, et al., 1992; Kouba, 1989).

"Teaching activities for multiplication and division need to give young learners the opportunity to explore different representations of multiplications and division and to reason about connections between these" (Barmby, 2009, p.60). In Case 3, additional problems were presented, regarding quotative division problems. In general, connecting the situations with the dividend, divisor and multiplier may cause problems in most cases (Neuman, 1999). But, providing children the opportunity to solve not only routine problems is the best way to help them construct the procedures for calculations.

Children develop their understanding by constructing relationships, and in order to understand they must speak something and be able to comprehend the relationships (Carpenter et.al., 1999, p.53). So, the „treatment process" as part of action research methodology impacted directly the improvement of the student"s ability to understand multiplication and division as inverse concepts and to solve different problems.

The findings of the action research carried out with the purpose of finding a remedy to resolve the problems faced by the Class V students of in Panchayat Union Middle School, Pillaiyarpalayam, Kanchipuram,, in understanding about multiplication is summed up as follows;

1. Hands on experience in the form of individual as well as group work, help the learners as it changes the atmosphere of the classroom.
2. Multi-sensory approach to teaching and learning is effective.

ISSN: 2347-2979

3. Sufficient amount of time should be spent on proper development of concepts in the minds of students. This can be achieved through drill and practice apart from teaching.
4. Variety of techniques and skills with proper scientific explanation will aid better cognition.

Thus, the following Hypotheses framed for the action research is found to be accepted on applying the findings of the study: *Multi-sensory approach with suitable drill and practice enhanced teaching complemented with suitable activities resolved the problems and helped in understanding of multiplication among the V Standard students.*

EDUCATIONAL IMPLICATIONS

Based on the findings of the present action research the following educational implementations are recommended;

1. Activity Based Learning Methodology is effective for teaching mathematics.
2. Multi-sensory approach should be adopted in classroom teaching.
3. Teacher should work on developing new and novel activities to challenge the cognition of the students.
4. Group activities make curriculum transactions dynamic and interesting.
5. The ability of students in grasping the mathematical concepts can be promoted through explanation of scientific terms and principles using multiple techniques.
6. Technology-based materials have proved to be effective in teaching a concept. Hence, teachers must be encouraged to utilize digital materials in their day-to-day teaching of mathematics.

PRACTICE AND REVIEW

Students now have at least 8 strategies that can help them solve multiplication facts. The important part now is to practice using these strategies. As a follow up teacher has to choose to repeat any activities that have been used to focus on a particular set of facts, or choose any of the following activities that will give students the opportunity to practice various strategies with numerous facts. Decisions should be based upon your students' needs.

CONCLUSION

Truly and indeed, Mathematics should be made meaningful to all. This implies that teachers should teach it with efficiency and effectiveness through the application of better strategies which make use of integrating worthwhile values in the teaching and learning of the subject. The process of collaboratively working toward the problem solving not only provides a wide range of expertise, but also generates positive working relationships. So, using action research in this study is considered as a very useful educational resource. The planning, interpretation, evaluation, and afterwards the adapted plan can provide useful resources for the improvement of student's abilities and skills. This research suggest that using different teaching and learning resources, appropriate activities and managing individual interventions in math learning centers /classes helps students construct and develop the basic concepts. Also, it suggests teachers to use word problems as tools for concept understanding and

ISSN: 2347-2979

also develop fact strategies. They should engage their students in solving and explaining their problem solving strategies by communicating within their group, and not just to get them oriented only to their textbook and 'to do pages'. Here group activities, worksheets, and drills needs to be strengthened. Teachers should look on the textbook as a teaching resource and not as object of instruction.

Investigating and developing good practice in basic Mathematics teaching through action research give the investigator and teacher the chance to develop model of teaching learning processes in order to be able to improve the quality of mathematics teaching. Teachers should be trained and encouraged to adopt multi-sensory approach, so that professionalism will be improved and above all learning will be joyful and meaningful experience for the learner.

Based on the findings the researcher has conveyed the importance of using multi-sensory approach coupled with activities as important component of teaching concepts in mathematics. She also encouraged the teacher to incorporate more of this approach enable positive classroom transactions. During the period of research, the students gave full cooperation to the investigator. Hence it is understood that if the teaching is done with various innovative activities students to learn the concepts easily. After the post-test analysis the investigator observed that the students were able to perform multiplication operation with ease which gave the researcher a sense of achievement and pride.

Specific recommendations have been made in the action research for planning and implementing effective teaching of Mathematics at the upper primary level education. Therefore, this action research proposes *maximization of utilization of multi-sensory approach experience in the form of activities, drill and practice* for effective teaching and learning of mathematics.

FUNDING

This action research was funded by SCERT, Tamil Nadu, a public organization under School Education Department, Government of Tamil Nadu.

ACKNOWLEDGMENT

We thank the Director, SCERT, Principal DIET, Kaliyampoondi, the Head Master, Teacher/s and students for their support, active participation and encouragement which enabled to complete this action research.

SOURCE

Alexander, R., 'Analysing Practice' in Bourne, 1994, *Thinking Through Primary Practice,* London: Routledge.

Altrichter, H., Posch, P., & Somekh, B. (1993). Teachers investigate their work: An introduction to the methods of action research. New York. Routledge.

Anghileri, J. (2000). Teaching numbers sense. London: Continuum.

Backhouse, J. and Haggarty, L., 1992, *Children, Teacher and Learning: Improving the*

ISSN: 2347-2979

Learning of Mathematics, London: CASSELL.
Bliss, et al., 1983, *Qualitative Data Analysis for Educational Research*, London: Croom Helm.
Brown, A., 1992, 'Mathematics: Rhetoric and Practice in Primary Teaching ' in Riley, J.(eds),1992, *The National Curriculum and the Primary School : Springboard or Straightjacket?*, London : Kegan Paul.
Carpenter,T. P., Fennema, E., Franke, M. L., Levi, L.,& Empson, B. S. (1999). Children‟s Mathematics. Cognitively Guided Instruction. Portsmouth, NH: Heinemann
Clift, R., Veal, M. L., Johnson, M., & Holland, P. (1990). Restructuring teacher education through collaborative action research. Journal of Teacher Education, 41(2), 52–62.
Cockroft, W.H., 1982, *Mathematics counts: Report of the Committee of Inquiry into the Teaching of Mathematics in School*, London: Her Majesty's Stationery Office.
Delamont, S., 1987, *the Primary School Teacher*, London: The Falmer Press
Dean, P.G., 1982, *Teaching and Learning Mathematics*, London: Woburn Press.
Dearden, R. F., 1976, *Problems in Primary Education*, London: Routledge&Kegan
Fischbein, E., Deri, M., Nello, M. S., & Marino, M. S. (1985). The role of implicit models in solving verbal problems in multiplication and division. Journal for Research in Mathematics Education, 16(1), 3-17.
Gray, E., & Tall, D. (1994). Duality, ambiguity and flexibility: A perceptual view of simple arithmetic. Journal of Research in Mathematics Education, 25(2), 115-141.
Greer, B. (1992). Multiplication and division as models of situations. In D. Grouws (Ed.), Handbook of research on mathematics teaching and learning. New York: MacMillan.
Jaworski, B., 1994, *Investigating Mathematics Teaching : A Constructivist Enquiry*, London : TheFalmer Press.
Kemmis, S., & McTaggart, R. (Eds.) (1988). The action research planner (3rd Ed.). Victoria: Deakin University.
Koshy, V. (2010). Action research for improving educational practice. A step-by-step guide (2nd Ed.). London: Sage.
MASHT (2004). Plani dhe Programi Mësimor, për klasën e dytë. Retrieved January 9, 2010, from www.masht-gov.net
Matematika 2 (2006). Botimi i tretë, Dukagjini-Pejë.
Mcniff. J, & Whitehead, J. (2010). You and your action research project. London: Routledge.
Mills, G. E. (2003). Action research: A guide for the teacher researcher. Upper Saddle River, NJ: Merrill/Prentice Hall.
Miller, D. M., & Pine, G. J. (1990). Advancing professional inquiry for educational improvement through action research. Journal of Staff Development, 2(3), 56–61.
Mulligan, J. T. (1992). Children‟s solutions to multiplication and division word problems: A longitudinal study. In G. William, & K. Graham (Eds.). Proceedings of the Sixteenth PME Conference, (pp. 144–151), University of New Hampshire, Durham, NII (USA).

ISSN: 2347-2979

Mulligan, J. T., & Mitchelmore, M. C. (1997). Young children‟s intuitive models of multiplication and division. Journal for Research in Mathematics Education, 28, 309-330.
Neuman, D. (1999). Early learning and awareness of division: A phenomenographic approach, Journal of Educational Studies in Mathematics, 40, 101-128.
Nunes, T., & Bryant, P. (1996). Children doing mathematics. Oxford: Blackwell.
Ponte, P. (2002). How teachers become action researchers and how teacher educators become their facilitators. Educational Action Research, 10(3), 399–423.
Rafferty, C. D. (1995). Impact and challenges of multi-site collaborative inquiry initiatives. Paper presented at the Annual Meeting of the American Association of Colleges for Teacher Education, Washington, DC.
Raymond, A. (2004). Collaborative action research in mathematics education: A tale of two teacher-researchers. Retrieved January 3, 2011, from http://www.eric.ed.gov/ERICWebPortal
Sagor, R. (2000). Guiding school improvement with action research. Alexandria, VA: ASCD.
Steffe, L. P. (1994). Children‟s multiplying schemes. In G. Harel, & J. Confrey (Eds.), the development of multiplicative reasoning in the learning of mathematics (pp. 3-39). Albany, NY: State University of New York Press. Teaching Student-Centered Mathematics: Volume 2, Van de Walle, p. 94 – 95.
Vatanabe, T. (2003). Teaching multiplication: An analysis of elementary school mathematics teachers‟ manuals from Japan and the United States. The Elementary School Journal, 104(2), University of Chicago.
Vergnaud, G. (1983). Multiplicative structures. In R. Lesh, & M. Landau (Eds.), Acquisition of Mathematics Concepts and Processes, (pp.127-174), New York: Academic Press.
Van de Wale, & John, A. (2004). Elementary and middle school mathematics: Teaching developmentally. Boston, MA: Pearson Education, Inc.
Wilson, E. (Ed) (2009). School-based research; A guide for education students. London: Sage.
Zuber, O. and Skerritt, 1992, Action Research in Higher Education: Examples and Reflection, London: Kogan Page Limited.