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A Study on the Level of Mastery of MLL's in Mathematics of V Standard Students in Selected Primary Schools.

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Abstract
Universal enrollment of children in the school going age is the main challenge before the nation and more so is the concern for providing a meaningful and useful education to them. This paper mainly concentrates on the level of mastery of MLL's in mathematics of V standard students in selected primary Schools. The Education is intended to develop basic learning skills, reading, writing and arithmetic and life skills, necessary for the children to survive and improve the quality of life. During childhood, developments in the domains of literacy and numeracy take place through acquisition of basic learning competencies. A large number of programmes and schemes have been initiated both by the Central and State Governments to realize the goal of the universalization of primary education. This has led to the opening of a large number of schools with emphasis on enrollment and retention coupled with focus on quality of education.
Keywords: enrollment, arithmetic, competencies, universalization

Introduction

Universalisation of Elementary Education (UEE) has been recognised as a one of the important pre-conditions to socio-economic and political developments of any society; particularly it is so in a developing society. The Government of India, recognising UEE as a goal of national importance has been putting every effort to achieve it. The provisions contained in the Article 45 of the Constitution of India insist on providing Free and Compulsory Elementary Education to all children. It may be observed however, that the present understanding of compulsory education is limited to compulsory schooling with physical enrollment of the child instead of facilitating the child to develop his/her academic interests. This could be achieved by making the school curriculum relevant by specifying the learning outcomes and by improving the instructional material and methods of teaching in the elementary schools.

Statement of the Problem

To study the level of mastery of MLL's in mathematics of V standard students in selected primary Schools

Need and Importance of the Present Study

The Education is intended to develop basic learning skills, reading, writing and arithmetic and life skills, necessary for the children to survive and improve the quality of life. During childhood, developments in the domains of literacy and numeracy take place through acquisition of basic learning competencies (BLC). These competencies represent levels of learning in a particular subject comprising basic knowledge, understanding, abilities, interests, attitudes and values. The competencies are essentially to be acquired by the end of a particular stage or standard of education. As far as the primary stage is concerned it is in fact the foundation stage for the development of basic competencies (BAS, 2002). Primary education in particular has remained a serious concern of the nation since independence. A large number of programmes and schemes have been initiated both by the Central and State Governments to realize the goal of the universalization of primary education. This has led to the opening of a large number of schools with emphasis on enrolment and retention coupled with focus on quality of education.

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Objectives of the Study

The main objectives of the study are

1) To study the level of mastery of MLL's in mathematics of V standard students in selected primary schools of Shimoga District

2) To identify the MLL attainment levels in mathematics of V standard rural and urban students of government primary schools of Shimoga District.

3) To find out the difference between male and female students in MLL attainment levels in Mathematics of selected schools of Shimoga District.

Hypotheses

1) *There is no significant difference in the competency levels of the students studying in different blocks (taluks).*

2) *Students studying in urban and rural areas do not differ significantly in their competency scores.*

3) *Male and female students do not differ significantly in their competency levels*

4) *There is no significant difference between male and female students in MLL attainment scores in Mathematics of schools of Shimoga District.*

Design of the Study

This is an experimental study with pre and post test design. In this study the investigator has selected 18 sub competencies from V standard text book of mathematics. These 18 sub competencies from seven main areas (competencies) were selected because in all the selected schools these competencies were taught in first semester. Based on these MLL competencies investigator adapted a standard test developed by Dr. H. M. Kashinath in the year 2005. The adaptation was made in the light of competencies taught. The adapted test was also tried out on 30 V standard students. The test finalized by dropping the competencies which were very easy and ware very difficult. The opinion of various experts was also taken for finalizing the adapted test. The test was used as pre and post test for assessing the effectiveness of the intervention for learning non mastered competencies.

Sample

The sample of the study initially includes 1457 students from 166 schools of seven blocks of Shimoga district, Karnataka. All the Government Primary schools of Shimoga district formed the units of the study. 10% of students selected from each block to achieve first objective of the study. This sample was stratified on the basis of rural and urban locale. All the V standard students studying in these schools initially formed sample of the study

MLL Competency Based Test in Mathematics

For assessing, MLL competencies taught in first semester were made as base for adapting the test which was developed by H.M. Kashinath, *et:al*., 2005. The investigator confined to the competencies taught only in I semester to V standard students.

Statistical Techniques Applied

Using SPSS for windows (version 16.0) following statistical methods were employed for the data collection in the present investigation.

1. Contingency coefficient analysis
2. Independent samples 't' test
3. One-way Analysis of Variance
4. Duncan's Multiple Range test

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5. Repeated measure ANOVA

The Limitation of the Study

1) This study comprises only 100 non masters from the V standard of (50 from) urban and (50 from) rural government primary schools from Shimoga district.

2) Only Kannada medium was taken up for study.

3) The MLL competencies which were taught in I semester only were considered.

Design of the Study

This is an experimental study with pre and post-test design. The investigator used these strategies for teaching all non-masters from rural and urban schools taken for the study. The investigator took one session in each school on alternative days for the experimental group. In this way the investigator covered all the non-mastered competencies during two months of intervention. After two months of intervention for the experimental groups, the investigator conducted post test for both controlled and experimental groups. The control group students were attending regular classes whereas students from experimental group were attending the intervention class outside the class room which was taken by the investigator himself. The performance of the students from pre and post tests was analyzed to assess the effectiveness of intervention on learning non mastered competencies.

Variables of the Study

The variable related to study the level of mastery of MLL's in mathematics of V standard students in selected primary Schools included remedial teaching which was considered as independent variable, attainment of MLL competencies was dependent variable. The other variables related to the gender, locales of the school (Rural/Urban) were considered as demographic variables.

Dependent Variable

The dependent variable selected for the present study was level of attainment on MLL competencies in Mathematics by the non-masters, selected from 5th standard of rural and urban schools.

Tool Used for the Study

The present study attempted on diagnosing non masters on the selected competencies hence the investigator used MLL competency based test in mathematics. Hypotheses 1 was matched on their MLL attainments, age, gender and locale and other variables stated above regarding basic infrastructure,number of teachers, medium of instruction and socioeconomic status of the families, level of their attainments on the selected competencies.

Competencies covered in Pre Test:

i) Numbers
ii) Different numerals
iii) Fundamental operations
iv) Fractions
v) Decimals fundamental operations
vi) Decimals addition and subtraction with mixed operations
vii) Angles

Table 1: Blue print of Pre-test

S.No	Contents	Knowledge	Understanding	Application	Skill	Total
1	Numbers	1(1)	2(1)	1(1)	1(1)	5(1)
2	Different numerals	1(1)	1(1)			2(1)

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3	Fundamental Operation	2(1)	1(1)		1(1)	4(1)
4	Fraction , decimal and percentage		2(1)	1(1)	1(1)	4(1)
5	Decimal fundamental operation	1(1)	1(1)	1(1)		3(1)
6	Decimal addition, subtraction and mixed fraction		1(1)	1(1)	1(1)	3(1)
7	Geometry angles		2(1)		1(1)	3(1)
	Total	**5(1)**	**10(1)**	**4(1)**	**5(1)**	**24(1)**

Note:Number outside the bracket indicates number of questions and number in the bracket indicates marks

One of the objectives of the study was to explore the MLL mastery level in mathematics for this; the review of related literature was done which revealed that the mastery level expectations were different for different studies. Ideally speaking, all children achieving all competencies were indicative of mastery achievement. However, this was hardly possible owing to various factors. It was found that the researcher had favoured mastery of at least 80 percent of the prescribed competencies as the mastery level hence the investigator also fixed the mastery level at 80 percent. The precise instructional objectives were formulated for adapting MLL competencies to be considered for finalizing pre test for this study.

Results and Discussion

This chapter presents the analysis of the data (done through SPSS software). The data were tabulated in descriptive tables prior to the statistical analysis and presented in this chapter. Each research question is presented within the statistical findings section. Each hypothesis was tested and verified through statistical analysis. The results obtained through are discussed here hypothesis-wise.

Hypotheses

1. *There is no significant difference in the competency levels of the students studying in different blocks (taluks).*

2. *Students studying in urban and rural areas do not differ significantly in their competency scores*.

3. *Male and female students do not differ significantly in their competency levels.*

4. *There is no significant difference between male and female students in MLL attainment scores in Mathematics of schools of Shimoga District.*

Hypothesis 1: *There is no significant difference in the competency scores of the students studying in different blocks.*

The investigator identified masters and non-masters based on pre-test and the number of masters and non-masters found from each block are given in table 4.3

Table 2 (a): Distribution of the sample by mastery and Blocks (taluks)

Blocks		Students		Total
		Non masters	Masters	
Soraba	Frequency	123	17	140

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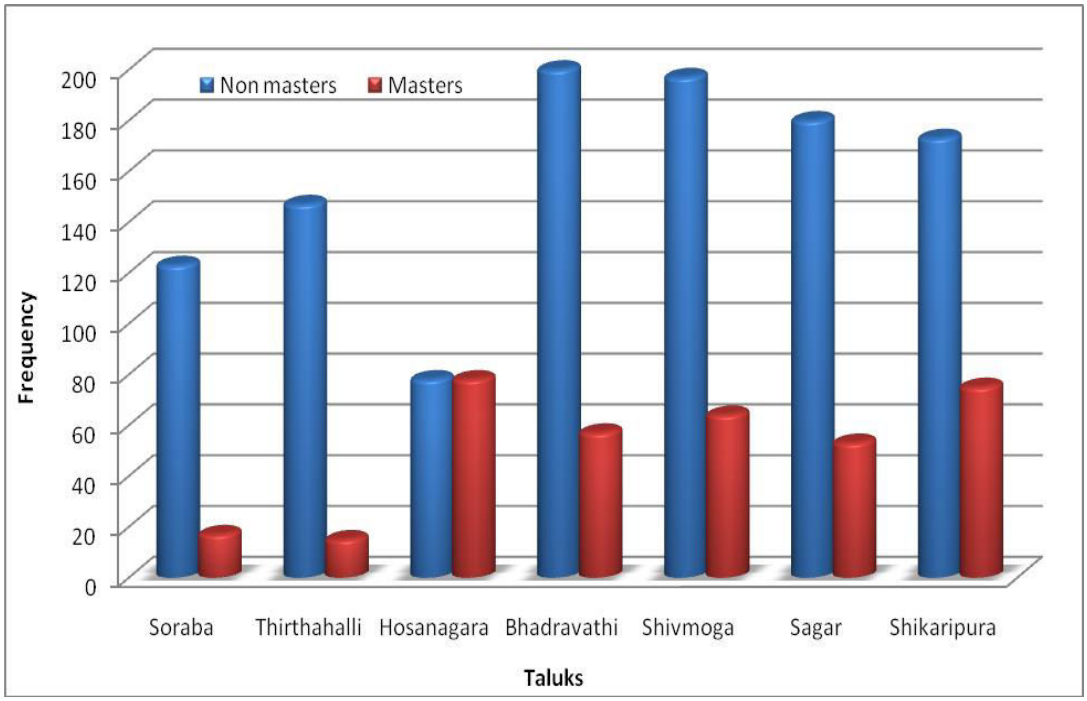
	%	11.2%	4.7%	9.6%
Thirthahalli	Frequency	147	15	162
	%	13.4%	4.2%	11.1%
Hosanagara	Frequency	78	78	156
	%	7.1%	21.7%	10.7%
Bhadravathi	Frequency	200	57	257
	%	18.2%	15.9%	17.6%
Shimoga	Frequency	197	64	261
	%	17.9%	17.8%	17.9%
Sagar	Frequency	180	53	233
	%	16.4%	14.8%	16.0%
Shikaripura	Frequency	173	75	248
	%	15.8%	20.9%	17.0%
Total	Frequency	1098	359	1457
	%	100.0%	100.0%	100.0%
CC=0.244; P<.000 (HS)				

From the table 4.3 (a) it can be seen that out of the total 1457 students selected from seven blocks of Shimoga district, Karnataka state for this study, 1098 students did not attain mastery and 359 of them were found to be having mastery. The number of availability of masters and non-masters also varied from one block to other. As in Hosanagara block, there were equal number of masters and non-masters, whereas in Bhadravathi and Shimoga the number of non-masters was more than masters. In other blocks the number of non masters was more as compared to less number of non-masters in Soraba and Thirthahalli. Further, contingency coefficient (CC) test revealed a significant association between blocks and mastery, where CC value of 0.244 was found to be significant at 0.000 level. Hence hypothesis 1 stated as "*There is no significant difference in the competency levels of the students studying in different blocks (taluks)"* is rejected as the test statistics showed significant difference in the competency levels of students studying in different blocks (Fig. 4.3).

Figure 1: Distribution of the sample by mastery and blocks



According to Second half yearly monitoring report of the Institute of Social and Economical change on SSA for Karnataka (2007) revealed that Hosanagarahas got more number of habitations though

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geographically it is a very small block compared to other blocks of Shimoga district. The basic reason is that in Hosanagara, the population (the communities) is scattered all over the block whereas the population in other blocks of Shimoga District is concentrated. And also literacy rate as per census reports showed that Hosanagara had an average of 71.3 % literacy (Male=81.5%, female=64.7%). As blockwise habitations and school access ratio (2007) results, it confirmed that Hosanagara had highest access rate (99.90 %) in primary education among the blocks of Shimoga district. It is quite evident that differences in geographical reasons and heterogeneity of the population influence over the attainment levels so this influence is seen in the case of Hosanagara taluk in the present study. Some of the studies revealed the reasons of the non attainment of competency levels in mathematics. Van de Walle (2005) observed, "the very fact that many students in grades 4 and 5 have not mastered addition and subtraction and students in the middle and upper grades do not have good command of their multiplication facts suggest that this method simply does not work well." Studies by Brownell and Chazal (1935) concluded that children develop a variety of different thought processes for basic facts regardless of the amount of drill they undergo (Van de Walle 2005). They also found that children create and hold on to procedures that develop from their own conception of numbers and that drill does not help students develop any new or more efficient strategies (Van de Walle 2005). However, drill can be used once a student has acquired an efficient strategy. Premature drill (using drill before a student develops their own understanding of numbers) will certainly be ineffective, waste valuable time, and for many students contribute to a strong dislike and a faulty view of learning mathematics (Van de Walle 2005).

Hypothesis 2: *Students studying in urban and rural areas do not differ significantly in their competency scores.*

Table 3(a): Distribution of non-masters and masters selected from urban and rural areas for this study

Sectors				Total
		Non masters	Masters	
Urban	Frequency	208	51	259
	%	80.3%	19.7%	100.0%
Rural	Frequency	890	308	1198
	%	74.3%	25.7%	100.0%
Total	Frequency	1098	359	1457
	%	75.4%	24.6%	100.0%
CC=0.053; P<.042 (S)				

Area-wise comparison revealed a significant association between area and mastery levels of the students where contingency coefficient of 0.053 was found to be significant at 0.003 level. From the table it can be seen that more students who found to be attaining mastery in MLL competencies assessed through pretest were from rural area in comparison to urban area as 19.7% of masters were from urban area whereas 25.7% masters were found from rural area (Table 4.4 for more details). Hence, hypothesis 2 stated as "*Students studying in urban and rural areas do not differ significantly in their competency scores* " is rejected, since the present study reveals that students from rural area were found to be better than urban area students in the mastery of competencies (Fig. 4.4 (i)).

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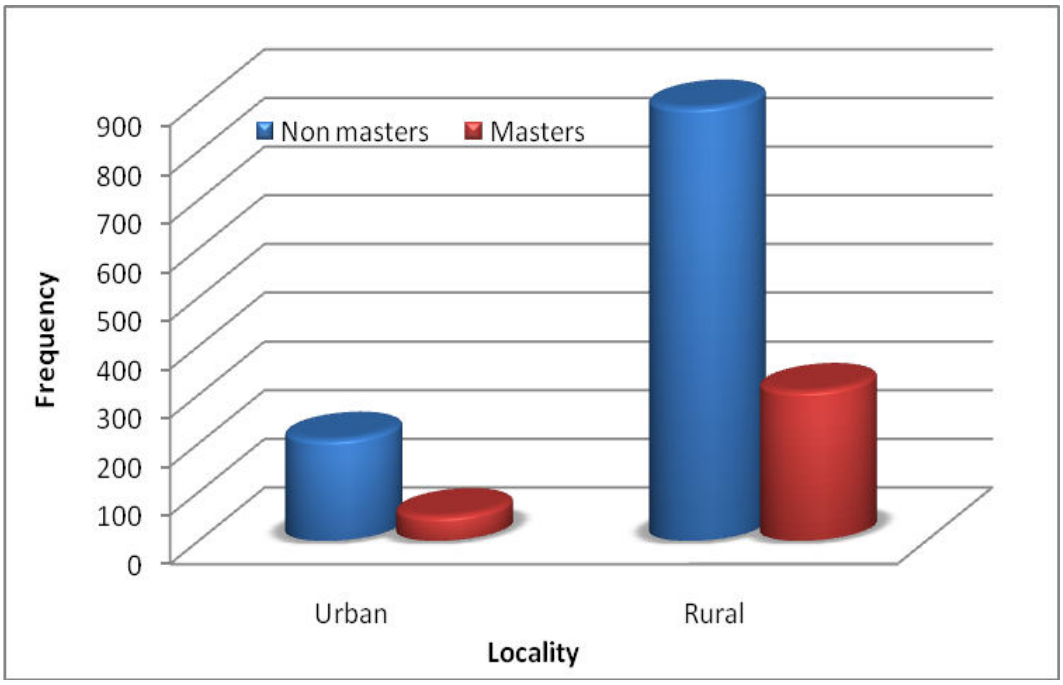
Figure (2): The graph given shows the distribution of the sample by mastery and area



In this study sample included only government primary schools of Shimoga district. The students in the rural sample were selected from government schools. Usually students of all levels of mathematical ability have no option, but to enroll themselves in government schools. Thus, the students from rural areas present a more heterogeneous nature in mathematical ability than urban students. Usually in urban areas, children of well to do families are enrolled in private schools, which are perceived to be, and to an extent in actual sense qualitatively better than government schools. Naturally in urban areas, majority of students belongs to the higher ability group. In addition, in urban areas many of the children studying in private institutions opt for additional tuition classes than rural students. It is quite surprising that rural students outshined urban students and hence shown better performance in mathematics compare to rural students. In urban government schools almost all students enrolled come from lower economic levels and impoverished environment. Hence it is likely that they tend to be lower in their performance in mathematics competencies. Many studies quoted above reported lower mathematics achievement by urban students from government schools. In the present study the sample from urban and rural area was drawn only from government schools. As a result the rural sample becomes more heterogeneous having many higher ability students as well as lower ability students for the reason mentioned above. But the urban sample becomes more homogeneous which consisting students from first generation learners and poor family support. This difference between rural and urban students is due to these reasons.

Hypothesis 3: *Male and female students do not differ significantly in their competency scores*

For verifying this hypothesis, the investigator calculated contingency coefficient test according to this the number of male and female masters were found is given

Table 4 (a): Distribution of Sample by Mastery and gender

Gender		Mastery		Total
		Non masters	Masters	
Male	Frequency	549	155	704
	%	78.0%	22.0%	100.0%
Female	Frequency	549	204	753
	%	72.9%	27.1%	100.0%
Total	Frequency	1098	359	1457
	%	75.4%	24.6%	100.0%
CC=0.059; P<.025 (S)				

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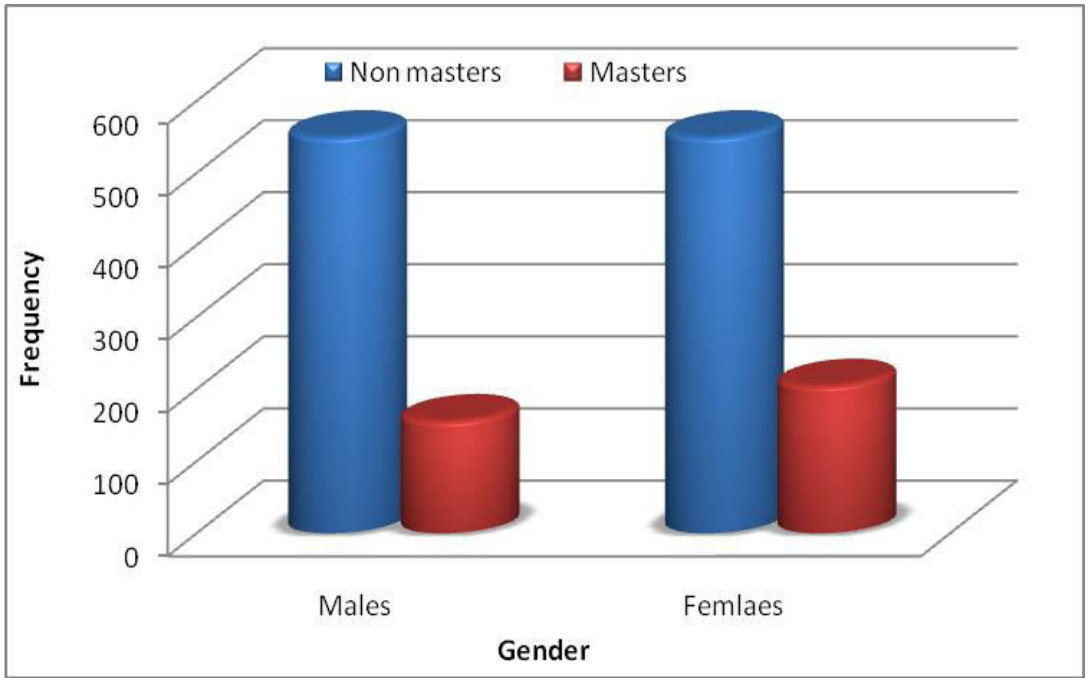
A significant association was observed between gender and level of mastery. Contingency coefficient of .059 was found to be significant at 0.025 level. From the table it can be seen that the number of female students attaining mastery more than male students (27.1% vs 22.0%). Hence hypothesis 3 stated as "*Male and female students do not differ significantly in their competency levels"* is rejected as we find that female students excelled male students in their competency level (Fig. 4.5 (i)).

Figure 3 : Distribution of number of male and female students showing mastery level



Research evidence has consistently shown that female students in Hawai'i outperform males in mathematics. Brandon, Newton, and Hammond (1987), who examined data from the 1982 and 1983 mathematics Stanford Achievement Test (SAT) administered to Hawai'i public school students in grades four, six, eight, and ten, found that overall, females consistently outperformed males across these grade levels. Brandon and Jordan (1994) examined the 1991 SAT mathematics results for tenth graders in Hawai'i and confirmed that girls performed better than boys. A majority of studies found that females perform better than males (DeMars 1998, 2000, Garner & Engelhard, 1999; Myerberg, 1996; Zhang &Manon, 2000). Rastogi, S (1983) attempted a study on diagnosis of weaknesses in arithmetic as related to the basic arithmetic skills and their remedial measures and he revealed that one of the important causes of backwardness in mathematics was the poor command over basic arithmetic skills.

Main findings of the study

Survey findings

1. Male and female students had statistically equal scores on all the competencies and also on overall performance, except for 'fundamental operations' where female students excelled male students.

2. Rural and urban area-wise comparisons revealed that rural students scored high in 'Numbers', 'Decimals addition and subtraction with mixed operations', and in 'total scores', than the urban students and in rest of the components students from urban and rural areas had statistically equal scores.

3. Block-wise comparison revealed that in numbers competency students from Sagar, Hosanagar and Shimoga had Highest scores, and Soraba taluk had least scores .

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4. In 'fundamental operations' competency, students studying in Hosanagara taluk had highest scores and students in Shimoga, Soraba, and Thirtahalli taluks had least scores.

5. In 'Fractions, decimals, and percentages competency, students studying in Hosanagara taluk had highest scores and students studying in Bhadravathi had least scores (Table 4.7.4).

Implications

1. Present remediation programme can be used by the teachers to improve mathematics achievement in schools.
2. The MLL strategy of the present study can be useful in implementing constructivistic approach in teaching learning.
3. A teacher in group based context of teaching should keep in mind that the instructional time required for mastery of competencies is not uniform across learners. Hence there could be additional time required for some learners when class is heterogeneous. Also, even in a group based instructional program remediation is a necessary condition for mastery.
4. The curriculum planners can design the curriculum based on concrete to abstract learning continua in mathematics by providing concrete, semi-abstract and abstract activities and games and live experiences in and around the pupils daily life activities which will lead to high level of attainment of MLL competencies..

Suggestions

1. Present remediation programme can be extended to other classes.
2. New methods like discussion method, guided discovery method, mastery learning and co-operative learning can be attempted by teachers.
3. This study can be extended in government aided and private schools in urban and rural areas.
4. Studies may be conducted in other curricular areas using diagnosis based remediation programme to study the effectiveness of the strategy.

CONCLUSION

The country needs today effective and productive citizens who display scientific and constructive thinking and attitudes in all walks of life. We have entered into the 21st century which is an era of information technology. The child of today has to be prepared for this era of technology for which a strong base of mathematics education is a necessary.

Main findings of the study

1) Male and female students had statistically equal scores on competencies and total scores, except for 'fundamental operations' where female students excelled male students.

2) Area-wise comparisons revealed that rural students had higher scores in 'numbers', 'Decimals addition and subtraction with mixed operations', and in 'total scores', than in urban students and in rest of the components students from urban and rural areas had equal scores.

3) Sector-wise comparison revealed that in C1- Soraba had least scores, Sagar, Hosanagar and Shimoga had Highest scores, Thirthahalli, Shikaripura and Bhadravathi students had the scores on competency in between.

4) In 'fundamental operations' competency students studying in Shimoga , Soraba, Thirtahalli had least scores, Hosanagara had highest scores, students studying in Bhadravathi, Sagara, Shikaripura taluks had the scores in between.

5) In 'Fractions, decimals, and percentages, competency students studying in Bhadravathi had least scores, Hosanagara had highest scores, and students studying in Sagar, Shikaripura and Shimoga had moderate scores.

6) In 'Decimals fundamental operations' competency students of Soraba and Thirthahalli had least scores, and students of Shimoga and Hosanagar had highest and others in between.

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Educational Implications of the present study

1. A teacher in group based context of teaching should keep in mind that the instructional time required for mastery of competencies is not uniform across learners. Hence there could be additional time required for some learners when class is heterogeneous. Also, even in a group based instructional program remediation is a necessary condition for mastery.

2. It was found out from the present study that diagnosis based remediation programme leads to mastery of competencies in mathematics among non masters . But time taken for mastering competencies by all non-masters was higher than the time allotted in the school for teaching. In the rigid time frame of an academic year it would then be necessary that the competencies that are difficult for the students may be identified and shifted to the bridge course. This will be the requirement for the diagnosis based remediation programme prescribed for a grade to be appropriate for the learners and for ensuring universal achievement of a comparable standard by all learners.

3. The curriculum planners can design the curriculum based on concrete to abstract learning continua in mathematics by providing concrete, semi-abstract and abstract activities and games and live experiences in and around the pupils daily life activities which will lead to high level of attainment of MLL competencies.

4. Training programme can be designed for training the primary school teachers in adopting diagnosis based remediation programme for teaching mathematics at the primary level.

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