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A CRITICAL STUDY OF THE ATTAINMENT OF COMPETENCIES IN MATHEMATICS AT THE FIFTH STANDARD LEVEL

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ABSTRACT: Enhancing learning achievement, one of the targets of Universalization of Elementary Education, depends heavily on the possibilities of developing minimum competencies in learners as they progress in the school. Assessment of competencies should logically be preceded by studies on the present status of learning levels among students. The present study was planned with a view to evaluate the competencies attained in mathematics by students of class V under different conditions of schooling.

INTRODUCTION

There are imbalances not only in the matter of enrolment of children in the various parts of India, but also in the educational achievements of pupils. This achievement gap is of great concern to those who are interested in education, since it breeds strata and sub-strata among pupils undergoing a common general education. Hence, fulfilling "the dream of universal primary education" depends heavily on the possibilities of developing minimum competencies in children as a result of the sequential learning that takes place as the children progress in the school.

Learning is not merely collecting facts and information or memorising them. It is an outcome of experiences derived from specific learning situations. While the curriculum must cater to a wide range of learners and learning situations, it needs to be locally specific to be

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meaningful for the learner. Hence, the bases of minimum learning in primary schools need to be a 'core of competencies' which are common for all learners. Thus a common curriculum should lead to a 'common core of competencies'. However, this core has to be minimal to provide for the constraints of time, facilities and resources.

Learning in any school subject is a continuous process whereby acquisition of one competency is a prerequisite to the acquisition of some other competencies. At any stage, acquisition of a competency is not an end in itself. The learning continuum is a progression of competencies from the earliest learning experiences to the level expected to be achieved at the end of primary schooling. However, for reasons of organisational and implementation conveniences, it should be possible to divide the learning continuum into as many levels of learning as there are grades. Since the- learning expected at each grade level is of a minimal nature.

While arriving at the essential competencies at a particular grade level of learning and for various grade levels, factors such as needs of the child; his/her capacity to learn, the knowledge, skills and attitudes developed as a result of his/her experiences at home, shool and community, later expectations from the child, would all play an important role. Basically, prescribing the competencies to be mastered at a particular grade level is useful for designing learning and evaluation strategies. It could work even as a yardstick for deciding the point of entry for those who would avail multiple entry opportunities as in the non-formal system of education.

THE PRESENT STUDY

Assessment of learning competencies of a particular grade of learning will provide the present status of learning levels among children attending primary schools. A thorough understanding of the present levels of competencies of children in different subject areas and at different grade levels could enable those interested in achieving minimum required competencies to draw realistic plans for implementation.

Competencies prescribed at each grade level could be used as the criteria against which the pupils in different contexts of schooling and undergoing education in different types of schools need to be assessed. Even though the levels of competencies attained by pupils in different types and contexts of schooling would be different, it is necessary to know the exact

levels of attainments in terms of specific competencies. This would not only present a clear picture of the levels of learning presently achieved by learners but also bring out the strengths and weaknesses in the primary education.

Mathematics plays an important role in school learning and also assumes a prominent position in modern education and curriculum. Without mathematics many possible careers-even careers that are unknown today may be closed to him/her. In fact, not just mathematics, but also a strong foundation in mathematics is needed by almost all the disciplines. Thus, in these circumstances of increased importance and influence of mathematics, just a computational know-how of mathematics is not enough, the development of concepts and ideas of mathematics is a necessity in day-today life and useful for continuing education in higher classes and courses. Mathematics education at the primary school level is the first basic step or foundation towards mathematics education as a whole. Hence it becomes very essential to assess and understand the students' attainment of competencies at the primary level.

In this background, the present study was planned with a view to evaluate the competencies attained by children undergoing their primary education under different conditions of schooling. It was thought that grade V, which is the terminal grade of primary education, was appropriate for the study owing to the following two reasons:

-generally five years of schooling is considered as necessary for not relapsing into illiteracy and this duration of schooling would bring out more clearly the differences in the attainment of competencies among pupils under differing conditions of schooling.

-Pupils in this grade would be more appropriate in written comprehension which is essential while taking a written test.

OBJECTIVE OF THE STUDY

The objective of the study was to critically assess the attainment of competencies in mathematics of V standard students in relation to:

-curriculum

-locality

-management

-medium of instruction

HYPOTHESES OF THE STUDY

1. The CBSE and State Curricula produce masters of individual and overall competencies in mathematics at the terminal state of primary level.
2. The state curriculum produces masters of individual and overall competencies in mathematics among students studying in urban - Kannada medium - government and private schools.
3. The state curriculum produces masters of individual and overall competencies in mathematics among students studying in urban- private-Kannada and English medium schools.
4 The State curriculum produces masters of individual and overall competencies in mathematics among government-Kannada medium rural and urban schools.
5. The C.B.S.E. curriculum produces masters of individual and overall competencies in mathematics among students studying in urban-English medium-private and government schools.

SAMPLE FOR THE STUDY

The independent variables considered to investigate into the mastery of competencies in mathematics by the students of standard V are curriculum, management, location and medium of instruction. The method of 'purposive cluster sampling' was used in the selection of sample for this study with schools as a unit and the students in a class as cluster. A total of 450 V standard students, studying in the schools in and around the city of Mysore, constitute the sample for the present study.

DEVELOPMENT OF CRITERION-REFERENCED ACHIEVEMENT TEST

The competencies to be mastered by V standard students are considered for the study. The twenty competencies selected from V standard mathematics curriculum constituted the criteria for the development of achievement test. 80 percent or more children mastering at least 80 percent of the prescribed competencies was kept as the mastery level for this study. The type of criterion referenced test used in this study was objective-referenced test as recommended by Shaycoft (1979). This essentially consists of stating the objectives and generating there from

precise learning objectives. Items to measure each of the competencies were constructed depending upon the nature of the competency.

Competency-wise number of items and cut-score for mastery are given in Table-1.

Table – I

Sl No.	Competency	Number of items	Cut score
1	Writes the numerals representing the given numbers.	10	8
2	Writes the number names of given five digit numbers.	10	8
3	Recognises the place valve of a digit in the given five digit numbers.	5	4
4	Arranges the given five digit numbers in ascending order.	10	8
5	Finds the sum of 2 or 3 five digit numbers.	10	8
6	Finds the difference between 2, five digit numbers	10	8
7	Find the factors of the two digit numbers	10	8
8	Find the multiples of the 1and 2 digit numbers	10	8
9	Calculates the product of 2, two and three digit numbers.	10	8
10	Divides a number up to 3 digit by a number not exceeding 20 with remainder	10	8
11	Expresses the fraction representing the parts of the figure to the whole in the given geometrical figures with certain parts shaded.	10	8

12	Finds the sum of the proper fractions with same denominator	10	8
13	Finds the difference between the proper fractions with same denominator	10	8
14	Measures and identifies different types of angles.	10	8
15	Constructs the circles for the given measurement.	3	2
16	Converts Kilometres to metres, metres to centimetres and vice-versa	5	4
17	Converts millilitres to litres and vice-versa	5	4
18	Finds the perimeter and area of rectangles and circles.	10	8
19	Represents the data through pictograph and bar graph.	5	4
20	Solves simple verbal problems involving one or more of the fundamental operations on whole numbers.	5	4

Suitable modifications were made in the test based on the opinion and suggestions of subject specialists. The test was also administered to few selected students from different schools for deciding the duration of the test. The reliability of the achievement test was established in terms of split-half method indicating internal consistency of the test. Validity of the subtests were established by computing the Kappa coefficient.

DATA COLLECTION

The test thus developed was administered to the students of V standard, who were the subjects for the present study. Number of items answered correctly for each competency was obtained for each student. Students who obtained 80 percent or more in each competency were

designated as masters of the competency measured. Those who mastered 80 percent or more of the competencies were considered as the masters of overall competency.

ANALYSIS AND INTERPRETATION OF DATA

The binomial test was used to determine the significance of mastery of the individual and overall competencies. The Z-test was employed to establish the significance of difference between the masters from comparison groups. Further analysis was made to estimate the percentage of masters of the various competencies. The observed percentage of masters of the individual and overall competencies from the different groups is presented in Table 2.

Table-2

Observed percentage of masters of individual and overall competencies among students in the comparison groups.

Competency[+]	Percentage of Masters of

	State Curriculum					CBSE Curriculum		
	Rural Kannada Govt. School (n=74)	Urban Kannada Govt. School (n=88)	Urban Kannada Private School (n=130)	Urban English Private School (n=46)	Total (n=338)	Urban English Private School (n=35)	Urban English Govt. School (n=77)	Total (n=122)
1.	12	19	26	9	19	54	77*	70
2.	22	42	51	54	43	77*	91*	87
3.	5	8	10	7	8	26	55	46
4.	7	3	13	13	9	54	66	63
5.	42	51	62	72*	56	80*	91*	88
6.	32	16	19	39	24	43	34	37
7.	18	24	22	41	24	17	34	32
8.	19	15	9	22	15	20	36	40
9.	0	2	5	0	2	31	31	31
10.	0	2	2	0	2	14	17	16
11.	45	71	60	44	57	86*	90*	88
12.	46	71	48	83*	58	69	80*	82
13.	35	63	47	76*	52	69	73*	71
14.	21	21	30	34	27	52	61	57

15.	10	30	41	48	32	77*	68	71
16	0	3	0	4	2	3	17	13
17.	0	1	0	0	0	11	21	18
18.	0	1	0	0	0	17	27	24
19.	8	6	7	0	6	65	65	65
20.	1	0	13	0	5	6	19	15
Overall	0	0	0	0	0	6	6	4

+ The competencies from 1 to 20 are presented in the same order as in Table -1.
* Significant at 0.05 level,

THE INDEPENDENT VARIABLE-WISE ANALYSIS HAS BEEN MADE IN THE FOLLOWING PARAGRAPHS.

A scrutiny of the results in table 2 reveals that none of the competencies was mastered by at least eighty percent of students following the State curriculum as against four of the competencies- writing the number names of the given numbers (2); finding the sum of 2 or 3 five digit numbers (5); expressing the fraction representing parts to whole relationship shown in a geometrical figure (11); and finding the sum of the proper fractions with same denominator(12) - mastered by at least eighty percent of students following the CBSE curriculum. Further, it can be observed that ten of the competencies were mastered by less than 10 percent, four more by less than 25 percent and only five competencies were mastered by 50 to 60 percent of students following the State curriculum. Even estimated percentages of masters of the competencies from this group were far below the expected eighty percent of masters.

It can also be noticed that the competencies conversion of different types of quantities from one unit to another (16, 17, 18) and solving simple verbal problems involving one or more of the fundamental operations on whole numbers (20) were found to be most difficult to master

for almost all the students in both the groups. On the other hand, the competencies- recognising the place value of a digit in a number (3); Arranges the given five digit numbers in ascending order(4); Calculates the product of 2, two and three digit numbers. (9); Divides a number up to 3 digit by a number not exceeding 20 with remainder (10), and Represents the data through pictograph and bar graph. (19) - were mastered by less than ten percent of the students following the state curriculum.

Management

A comparison of data pertaining the CBSE urban English medium schools under private and government management reveals that both the groups had mastered the competencies 2, 5, 11 and 12. Competency 1 and 15 were mastered by the students in the government and the private CBSE School respectively. Both groups had 6 percent students who had achieved mastery of overall competency. The test of significance of difference between masters in the two groups showed that the government CBSE school had significantly higher number of masters on competencies 1,2,5, 11,12 and 13 whereas, the private CBSE school students were significantly superior on competency 15 only. Among the urban - Kannada medium government and private schools following the state curriculum, none of the competencies was attained to mastery level by students. The test of significance revealed that the private school students were significantly superior to the government school on competency 5, 12 and 13.

Medium of Instruction

A comparison of data pertaining to urban-private state curriculum schools imparting education to through Kannada and English medium reveals that while no competency was mastered by the students of Kannada medium school, there were three competencies (5,12 and 13) mastered by the students of English medium school. Further testing of significance of difference between masters showed that the English medium students were significantly superior to the Kannada medium students on six competencies (6.7.8, 12, 13, 14 and 15). The Kannada medium students, on the other hand, were significantly superior on competency 1, 11 and 20.

Locality

A scrutiny of percentage of masters in the government Kannada medium-urban and rural schools following the state curriculum reveals that no competency was mastered by students from both the groups. There were 85% of students mastering less than 80% of the competencies. The test of significance of the difference between masters revealed that while the urban students were significantly superior to the rural students on five competencies (2,11,12,13 and 15), the rural students were significantly superior on competency 6 only.

CONCLUSION

In this study 80 percent of competencies mastered by 80% of the students was fixed as the expected level of mastery. Even though a wide variety of educational contexts were represented, no school had achieved the mastery level. This means that, whatever -be the kind of school attended, a student is likely to complete his primary education without mastering even 80% of the competencies. The CBSE curriculum had succeeded in ensuring that at least a few students have achieved more than 80% of the competencies in mathematics and some more would do so if the instructional time is increased. The school following state curriculum had failed to enable even a single student to master at least 80 percent of the competencies in mathematics. The situation was worse in the rural schools where, almost all children had failed to achieve a large majority (90 percent) of the competencies. In other words, a student completing primary education in a rural school would never be able to attain 80 percent of the competencies in mathematics at the terminal stage of primary education. This would eventually pose tremendous difficulties to the student in attaining competencies of the higher classes as well. In the order of achievement of competencies, the students undergoing their primary education in different context may be arranged in an ascending order as

-Rural, - government, -Kannada medium school following state curriculum.

-Urban, - private, -Kannada medium school following state curriculum.

-Urban,- government, -Kannada medium schools following state curriculum.

-Urban, -Private, - English medium schools following State curriculum.

-Urban, -government, - English medium school following CBSE curriculum.

It may be concluded from the study that even though there seems to be a difference between the state schools and CBSE schools in favour of the CBSE School, much needs to be done to ensure achievement of competencies in mathematics at the primary level. While reducing the expected level of mastery of the competencies to designate some of the non-masters as masters would be undesirable from the point of view of maintaining quality of primary education, the alternative would be to reduce the number of competencies. This would require a serious review and rethinking into the list of competencies at the terminal stage of primary education. Apart from this, the disparity between the CBSE and the State curriculum schools or the urban and the rural schools could only be overcome by improving the quality of instruction and increasing the instructional time.

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