

Chapter-VI

FINDINGS AND DISCUSSION

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Chapter-VI

FINDINGS AND DISCUSSION

6.1 Introduction

In the previous two chapters, data have been analyzed and interpreted to arrive at the findings of the study. Here, the major findings based on the previous two chapters are listed in section 6.2 to enable the investigator to discuss all of them in light of the objectives of the study. Based on the discussion given in section 6.3; the conclusion and suggestions for the study are derived which are given in sections 6.4 and 6.5 respectively.

6.2 Major findings

Major findings given in this section are mainly subdivided in two subsections namely.

6.2.1 Major findings based on the analysis of mathematics curriculum

6.2.2 major findings based on the analysis and interpretation of data.

The subsection 6.2.2 is further divided into four parts namely A, B, C and D.

6.2.1 Major Findings based on the Analysis of Mathematics Curriculum

- (1) The set of objectives of mathematics curriculum considered by West Bengal Board of Primary Education (WBBPE) is larger, more comprehensive and maintain the logical order of presentation than the set of objectives prescribed by Bangladesh National Curriculum Textbook Board (BNCTB). Also, it is found that the set of objectives prescribed by WBBPE focus on higher level cognitive development of pupils while similar objectives focusing on higher level ability are absent in the list of objectives prescribed by BNCTB.

But none of these sets of objectives are at par with the standard set of objectives as prescribed by the experts of RCDICMDCA.

- (2) Objectives of mathematics curriculum in West Bengal are giving specific direction to the textbook writers (for deciding content of the textbook) and teachers (which illustrations to be given and when) while objectives of

mathematics curriculum of Bangladesh are not much directive to suggest the specific guide lines to textbook writers (for deciding content of the textbook) and teachers (which illustrations to be given and when).

- (3) No specific objective is prescribed by BNCTB related to the topics such as mensuration, graph and geometry, in spite of this; these topics find place in the textbook at appropriate place. Whereas objectives related to the topics mensuration, graph and geometry are given in the WBBPE curriculum and are reflected through the content given in the textbook of west Bengal of India.
- (4) Five learning areas such as ‘number and numeration’, ‘four fundamental operations’, ‘day-to- day life problems’, ‘pictorial representation of data’, and ‘geometry’ are common areas included in the textbooks of both countries for grades I to V. The content related to ‘manipulation of concrete objects and counting’ is more emphasized and spirally distributed (in grads I to III) in the textbooks prescribed by BNCTB while manipulation of counting is not highlighted in the textbook of WBBPE even though the topics related to counting numbers are present in the text books of West Bengal.
- (5) Organization of content in the textbook of BNCTB and WBBPE are a combination of both topical method and spiral methods. At the same time, it is also observed that textbooks of West Bengal have given more emphasis on spiral method compared to the textbooks of Bangladesh.
- (6) Introduction to each topic in the text books of WBBPE is made more interesting than that of BNCTB.
- (7) Purpose of the lesson/unit has been written in the left-top corner of the textbooks (except grade-V) of WBBPE; whereas the same is absent in the textbooks of BNCTB.
- (8) More pictures, diagrams, graphs, tables are included and labelled in better way in the textbooks of BNCTB than that of WBBPE.

- (9) Geometry has been distributed spirally through grades II to V textbook content of Bangladesh while the same topic is distributed spirally in grades IV to V textbooks of West Bengal.
- (10) Content list and end-of-chapter exercises have been included in the textbooks of WBBPE more systematically than that of BNCTB.
- (11) Language used in the textbooks of Bangladesh and West Bengal are quite simple and informal (except the language used in unit six of grade-I in West Bengal).

6.2.2 Major Findings based on the Analysis and Interpretation of Data

Here, the major findings are presented in the tabular form containing four columns. The first column 'A' is based on the major findings arrived at through the analysis and interpretation of responses given by primary mathematics teachers (Refer 5.2). The second column 'B' is based on the major findings arrived at through the analysis and interpretation of responses given by academic supervisors (Refer 5.3). The Third column 'C' is based on the major findings arrived at through the analysis and interpretation of responses given by experts (Refer 5.3). The fourth column 'D' is based on the major findings arrived at through the analysis and interpretation of classroom observations (Refer 5.4).

Table-6.1: Major Findings based on the Analysis and Interpretation of Data

(A) Findings based on Questionnaire given to Mathematics Teachers	[B] Findings based on Questionnaire given to Academic Supervisors	[C] Finding based on Opinionnaire given to Experts	[D] Findings based on Classroom Observations.
<p>(1) On the basis of the academic result (class/division), it was found that West Bengal mathematics teachers' scholastic achievement is higher than that of Bangladesh teachers.</p>	<p>(1) According to academic supervisors of Bangladesh, highly populated classrooms, inattentive pupils, teacher not encouraging pupils and teacher's own textbook only are the most common problems in classes whereas in the opinion of academic supervisors of West Bengal, only highly populated classrooms is the most crucial problem.</p>	<p>(1) According to Bangladesh experts objectives in general for primary mathematics curriculum and specifically the objectives for developing basic skills, understanding and attitudes are suitable to a great extent. On the other hand, according to West Bengal experts objectives for developing basic skills (understanding of numerical concepts), and attitudes are suitable to a great extent.</p>	<p>(1) On an average in West Bengal mathematics teachers get more time for teaching of mathematics (each periods of 35 minutes duration in Grades I-II level and 40 minutes duration in grades III-V level) than that of the Bangladesh mathematics teachers.</p>
<p>(2) Most of the teachers of Bangladesh (71%) are not deputed for in-service training while most of the teachers of West Bengal (67%) are deputed by authority for the in-service training programmes.</p>	<p>(2) It was found that 'inappropriate seating arrangement' and 'lack of pupil-teacher rapport' are major (common) problems in Bangladesh than that of West Bengal during the teaching of mathematics.</p>	<p>(2) According to Bangladesh experts content incorporated for developing mathematical knowledge, thinking (specifically for content: concept of number, FFOs and fraction), skills and attitudes are suitable to a great extent. On the other hand, according to West Bengal experts content incorporated for developing (concept of numbers) awareness (about unit of money, length, weight, area, square, measure and time in terms of using them in daily life) are suitable to a great extent.</p>	<p>(2) Majority of mathematics teachers (96.6%) from Bangladesh do not use the lesson plan / out line in the classroom instruction while mathematics teachers in West Bengal (73.4%) do not use the lesson plan / out line in the classroom instruction.</p>
<p>(3) More barriers are found in Bangladesh compared to West Bengal for in-service training programme. Teachers from Bangladesh (73%) and West Bengal (33%) opined that one of the main barriers is 'shortage of mathematics teachers in the schools'.</p>	<p>(3) Teachers and pup. related problems were found more in Bangladesh classrooms than that of west Bengal. There are similar type of problems in classrooms of both countries like insufficient use of teaching aids, lack of mastery or conceptual understanding of mathematics subject by the teachers, irregular attendance of learners and inappropriate teacher-pupil ratio.</p>	<p>(3) According to Bangladesh experts, it was found that class-wise competencies are suitable to a great extent. On the other hand, according to West Bengal experts, it was found that</p>	<p>(3) It was found that all teachers and pupils from both countries use mathematics text book during teaching-learning process in the classroom.</p>
<p>(4) Teachers of Bangladesh desire to extend professional training on teaching mathematics more than that of West Bengal in absence of training.</p>	<p>(4) In addition to these common problems of both the countries, in Bangladesh, problems were found in mathematics classes like 'shortage</p>	<p>(4) 45% teachers from Bangladesh introduced the lesson with reference to previous knowledge of the pupils while 43.4% teachers did not use previous knowledge for introduction of the lesson. In contrast, a vast majority of teachers from West Bengal</p>	<p>(4) 45% teachers from Bangladesh introduced the lesson with reference to previous knowledge of the pupils while 43.4% teachers did not use previous knowledge for introduction of the lesson. In contrast, a vast majority of teachers from West Bengal</p>
<p>(5) Teachers of Bangladesh desire to extend professional training on teaching mathematics more than that of West Bengal in absence of training.</p>	<p>(5) In addition to these common problems of both the countries, in Bangladesh, problems were found in mathematics classes like 'shortage</p>	<p>(5) According to Bangladesh experts, it was found that class-wise competencies are suitable to a great extent. On the other hand, according to West Bengal experts, it was found that</p>	<p>(5) It was found that all teachers and pupils from both countries use mathematics text book during teaching-learning process in the classroom.</p>
<p>(6) By and large, use of teaching aids is more by the teachers of West Bengal in respective contents as compared to teachers of Bangladesh.</p>	<p>(6) In addition to these common problems of both the countries, in Bangladesh, problems were found in mathematics classes like 'shortage</p>	<p>(6) According to Bangladesh experts, it was found that class-wise competencies are suitable to a great extent. On the other hand, according to West Bengal experts, it was found that</p>	<p>(6) It was found that all teachers and pupils from both countries use mathematics text book during teaching-learning process in the classroom.</p>

<p>(7) It was found that 'Word problems' were common difficult topics across the grades I to V of both the countries. To overcome this learning difficulties in both countries corresponding remedial teaching of similar kind such as repeated drilling, teaching weak pupils separately were adopted by teachers Bangladesh and West Bengal. In addition to this, for the removal of the learning difficulties different remedial teaching measures adopted by teachers of Bangladesh, were such as explanation of problems, teaching through teaching aids and group work whereas West Bengal teachers used extra time to teach the pupils individually, pocket board and sometimes they took the help of the bright pupils to teach weak pupils.</p>	<p>of trained teachers', 'insufficient number of writing materials for pupils', and 'difficult content in mathematics textbook'. In West Bengal classrooms problems such as teachers have no clear understanding regarding the objectives of mathematics teaching, mathematics syllabi and evaluation procedure were also prominent.</p>	<p>(87%) introduced the lesson based on the previous knowledge of the pupils and the relevant activities.</p>
<p>(8) Teachers from Bangladesh: (43%) and West Bengal (47%) opined that the allotted periods are not enough for teaching of mathematics. They suggest for additional period for grade-wise mathematics teaching.</p>	<p>(4) According to academic supervisors of both countries, it was found that the human and non human resources have direct impact in process and product of mathematics teaching.</p>	<p>(5) 45% teachers in the schools of Bangladesh adopted the teaching approach from general to specific while 58.49% teachers of West Bengal adopted the teaching approach from concrete to abstract while teaching respective topics.</p>
<p>(9) The most commonly used teaching method is the problem-solving method used by almost all teachers of both countries followed by the question-answer. In this regard, West Bengal teachers used 'Problem-solving' and 'question-answer' more than that of Bangladesh teachers.</p>	<p>(5) No suggestions were found to incorporate new contents in the mathematics curriculum for covering more socio-cultural aspects of the learners' society from the experts of both the countries. However, curriculum specialists (50%) and subject specialists (75%) from Bangladesh emphasized to include adequate socio-cultural aspects in the existing content of the textbook whereas suggestions have been received to shift content from one grade to another grade (according to learners' age) from curriculum specialists (67%) and all subject specialists of West Bengal.</p>	<p>(6) It was found that responses of the pupils in the schools of West Bengal (93.4%) were satisfactory because of correct answers obtained (orally or written) than those of the pupils in the schools of Bangladesh (66.8%).</p>
<p>(10) Majority of teachers of both countries opined</p>	<p>(6) Experts of Bangladesh (63% curriculum specialists and all subject specialists) highlighted the need of introducing illustrative examples for explaining mathematics content that reflect</p>	<p>(8) Most of the mathematics teachers in the schools of Bangladesh and West Bengal of India used clear understandable language through specific words with and without illustrations, and their audibility remained clear through out their teaching in the classroom.</p>

<p>that shortage of non human resources such as mathematical models; mathematical games and instructional materials were the major problems / obstacles in mathematics teaching.</p>	<p>supervisor i.e. in-service training facilities are found more in West Bengal than that of Bangladesh.</p>	<p>different cultural aspects of the society to make it more interesting and comprehensive for the pupils, while 67% curriculum specialist of West Bengal highlighted the need of illustrative examples to comprehend arithmetic at the primary stage. All subject specialists highlighted the need for explaining mathematics content to make more interesting for the pupils.</p>	<p>blackboard. It was found that among the respondents of Bangladesh 41.6% used the blackboard 'always', 28.2% used blackboard 'frequently' and 30% used blackboard 'rarely'. Whereas in West Bengal, among the respondents, 15% used the blackboard 'always', 65% used blackboard 'frequently' and 30% used blackboard, rarely'.</p>
<p>(11) Majority (91%) teachers of Bangladesh and 71% teachers of West Bengal had teachers' manual on teaching mathematics. 92% teachers of Bangladesh felt that teachers' manual is necessary to teach mathematics effectively. On the other hand, 79% teachers of West Bengal opined that teachers' manual is not necessary to teach mathematics effectively. Further 17% teachers of Bangladesh opined that some more information is needed in teachers' manual while 25% teachers of West Bengal opined that some more information is needed in teachers' manual.</p>	<p>(9) It was found that teachers of West Bengal are more systematic and regular than that of teachers of Bangladesh with respect to use of lesson plan for teaching, prior preparation for class.</p>	<p>(7) According to curriculum specialists major strength of Bangladesh mathematics curriculum lies in its unified curriculum throughout the country which maintains horizontal (with other subjects) and vertical (within itself) co-ordination of well-graded content related to pupils, and life-oriented situations.</p>	<p>(10) 10% teachers from Bangladesh and 45% teachers from West Bengal used teaching aids, for this reason pupil observed keenly and asked the questions frequently. It was also observed that 90% teachers from Bangladesh and 55% teachers from West Bengal did not use teaching aids at all while teaching respective topics.</p>
<p>(12) The daily lesson plan used more by the teachers of West Bengal (72%) for teaching mathematics than that of teachers of Bangladesh (54%). A vast majority of the teachers from both countries report that they prepare lesson plan and annual plan which was written formally as well as non written.</p>	<p>(10) It was found that illustrative examples in socio-cultural context are essential for explaining mathematical content effectively as opined by academic supervisors of both the countries.</p>	<p>According to subject specialists major strengths of Bangladesh curriculum are due to clearly formulated objectives, illustrations of solved problems through socio-cultural aspects and manipulation of concrete objectives (especially for writing and counting number). According to curriculum specialists of West Bengal strength of the mathematics curriculum lies in well prescribed objectives (according to Bloom's taxonomy), integration of mathematical topics with daily life situations, child-centred activities, socio-cultural basis of mathematics and more focus on basic numerical concepts and operations.</p>	<p>(11) It was found that a vast majority of teachers in the schools of Bangladesh (90%) and West Bengal (96.6%) gave some classrooms assignments (either oral or written) to the pupils to work out in the classroom; while teaching mathematics topics.</p>
<p>(13) 75% teachers of Bangladesh and 79% teachers from West Bengal emphasized the need of illustrative examples in mathematics teaching (1) for explanation of some concrete / abstract content in which only verbal explanation is not</p>	<p>(12) 95% of academic supervisors from Bangladesh and all academic supervisors from West Bengal opined that objectives, competencies and content areas given in curriculum are appropriate for the learners</p>	<p>According to subject specialists of West</p>	<p>(12) It was found that 63.2% mathematics teachers in the schools of Bangladesh and 78.4% mathematics teachers in the schools of West Bengal assigned home task to the pupils based on content taught before ending the mathematics period.</p>

<p>enough. (ii) for inducing interest in learning among pupils. (iii) for seeking and sustaining attention of pupils towards lesson. In addition, to these, Bangladesh teachers felt need of illustrations for developing the logical and creative thinking of the pupils; and West Bengal teachers felt need for making problem solving easier and simpler.</p>	<p>(13) According to academic supervisors of both the countries; inappropriate methods of teaching, overcrowded classrooms, absence of lesson plan and resources were major reasons for ineffective teaching in classrooms.</p> <p>(14) It was found that common strengths of mathematics curriculum for both the countries are skills development in mathematics, suitable content-areas distributed grade-wise and arranged from concrete to abstract, appropriate evaluation procedure.</p>	<p>(13) It was observed that on average 71.8% mathematics teachers in the schools of Bangladesh did not summarize the lesson while teaching. On the other hand, it was found that 86.6% mathematics teachers in the schools of West Bengal summarized the lesson at the end of the class through questioning and problem solving while teaching.</p>
<p>(14) 32% teachers from Bangladesh responded that the socio-cultural aspects were reflected in grades I-III through the 'concept of number'; in grades I-V through the 'concept of currency', 'time' and 'four fundamental operations'; in grades III-V through the 'concept of measurement', 'geometry' and 'word problems'; in grade-V 'capital-expenditure', 'cash-memos' and 'graph'. In West Bengal, 33% teachers opined that socio-cultural aspects are reflected in the mathematics content areas in grades I-III through the 'concept of number', 'currency'; in grades I-IV through 'four fundamental operations'; in grades II-V through 'measurement', 'fractions', 'decimals'; and in grade-V through 'unitary method', 'percentage' and 'geometry'.</p>	<p>(8) Weaknesses of Bangladesh mathematics curriculum (based on curriculum specialists' opinion) are teachers' lack of proficiency in mathematics, less illustrations used in classroom, as a result, mathematics curriculum is not being implemented properly</p>	<p>(14) 85% mathematics teachers in the schools of Bangladesh used problem-solving method in teaching of mathematics in the primary classes (grades I-V). Most of the teachers in the schools of Bangladesh covered the major portion of a period by using the problem-solving method. Another method used by teachers of Bangladesh was the question-answer technique (56.4%). In contrast, 83.4% mathematics teachers in the schools of West Bengal used question-answer technique in teaching of mathematics in the primary classes (grade I-V). Another method used by the teachers of West Bengal was the problem-solving method (58.4%).</p>
<p>(15) According to 25% teachers from Bangladesh, the strengths of mathematics curriculum and its transmission are due to the class wise attainable content; content integration with the socio-</p>	<p>Subject specialists from Bangladesh opined that lack of content articulation from grade-II to III and no scope for developing skills of translating verbal statements into mathematical form and vice versa are the major weaknesses of mathematics curriculum.</p> <p>According to West Bengal curriculum specialists' ignorance of play way method, more content coverage in short period, less geometry, difficult word problems are considered as weaknesses of mathematics curriculum.</p>	<p>From the list, it is found that the list of strengths of West Bengal curriculum is larger</p>

<p>cultural aspects; evaluation procedure and developing clear concept of the topics such as 'FROs', 'fractions', 'numbers and numerals', 'unitary method', 'mean', 'LCM and HCF', 'measurement', 'percentage', 'capital-expenditure', 'graph' and 'time and their applications to daily life.</p> <p>On the other hand, 63% teachers from West Bengal indicated that innovative teaching, chalk and talk policy used minimally in the classroom, stimulates the learners' logical thinking, content sequentially arranged class wise, use of low-cost materials for teaching-learning activities, helpful in the application of mathematics in real life situations, helpful for children to develop an understanding from the specific to general, plays a key role in integrating science with other subjects and scientific base of existing mathematics curriculum are the strengths of mathematics curriculum and its transaction.</p>	<p>'than that of Bangladesh i.e. West Bengal mathematics curriculum is stronger than that of Bangladesh.</p> <p>(15) Academic supervisors from Bangladesh identified areas of the mathematics curriculum which contributes towards weakness of the curriculum are such as: resources (mathematics teachers, teaching aids, mathematical games, classroom and time for teaching the syllabi), lack of appropriate methodology, techniques and activities utilized by the teachers for transaction of curriculum, less opportunity to impart curriculum in relation to life situations; ambiguous explanation for some content areas in primary mathematics textbooks.</p> <p>Academic supervisors from West Bengal identified areas of the mathematics curriculum which contributes towards weakness of the curriculum are such as: complex language used for explanation of some topics (e.g. concept of zero, multiplication, division etc.) in textbooks for grades I-V, less attractiveness of the textbooks.</p> <p>From the list, it is found that Bangladesh mathematics curriculum is weaker than West Bengal curriculum.</p>	<p>Findings from subject specialists, indicates that no attempt to organize content from concrete to abstract and lack of using appropriate symbols for developing the skills of translating verbal statements into mathematical forms, insufficient concepts of number, lack of clarity of similar and dissimilar things are the major weaknesses.</p> <p>(9) Curriculum specialists from Bangladesh suggested that teacher training needs to be strengthened and mathematics teacher should be trained on teaching-learning strategy.</p> <p>Subject specialists from Bangladesh suggested that in-service training on mathematics should be made obligatory and lucrative at least after every five years trainees should be well equipped. Authority should be appointed only such mathematics teachers who themselves have studied mathematics.</p>
<p>(16) According to 25% teachers from Bangladesh, the weaknesses of mathematics curriculum and its transaction - due to complex and complicated 'word problems' related to the 'four fundamental operations and 'fractions', deficiency of charts for 'word system'; deficiency of in-service training facilities, difficulty in understanding existing examples of 'multiplication' and 'division'; inadequate number of teaching aids used; inappropriate definitions and ideas in</p>		

<p>'geometry'; insufficient concept clarification of topics such as 'metric system', 'simple interest' and 'area of triangle' for usage in daily life and overcrowded classroom in the urban areas. On the other hand, 63% teachers from West Bengal indicated that 'difficult content' for grade I and II; difficulty in understanding the 'resultant product' through factor analysis (for grade III); pupils find difficult to understand and convert the given numerical form into verbal statement and verbal statement to numeric form and solve them vice-versa; pupils find difficulty in understanding the language used in mathematics problem solving, given in text; lack of interest shown by pupils in learning some topics of mathematics such as 'change of units', 'word problems related to age', 'word problems related to fractions and geometry'; lack of adequate number of teachers and teaching aids; narrow classroom and classroom highly crowded in the urban areas are the weaknesses in its transaction.</p>	<p>(16) Academic supervisors of Bangladesh, have given more suggestions in context of training and recruitment compared to that of West Bengal academic supervisors</p>	<p>17. Teachers of Bangladesh have given more suggestions in context of training compared to that of West Bengal teachers.</p> <p>18. 53% of teachers from Bangladesh gave suggestions in context of recruitment of mathematics teachers who have studied mathematics</p>
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6.3 Discussion

The above findings of the study are discussed under four major subsections namely.

- 6.3.1 Discussion on objectives of mathematics curriculum and content-areas of mathematics textbooks in Bangladesh and West Bengal of India.
- 6.3.2 Discussion on teaching processes in mathematics classes of Bangladesh and West Bengal of India.
- 6.3.3 Discussion on problems and obstacles in transaction of mathematics curriculum in Bangladesh and West Bengal of India.
- 6.3.4 Discussion on major strengths and weaknesses of mathematics curriculum in Bangladesh and West Bengal of India.

6.3.1 Discussion on objectives of mathematics curriculum and content-areas of mathematics textbooks in Bangladesh and West Bengal of India.

Curriculum is the keystone of educational theory and practice. Objectives are important and a necessary step in the process of framing curriculum and imparting education. The objectives of curriculum should be clearly defined so that the textbook writers get specific direction about 'what content', 'which kind of illustrations' and 'exercises' could be included in the textbook. Also these objectives help the teachers in taking decision to integrate the content with different activities. It means that objectives give direction to content coverage and content gives the direction to the textbook writers and teachers in terms of activities to be conducted and evaluation procedure. Hence, to judge the quality of any curriculum it is very much necessary to study the objectives, syllabus and the content of the textbook prescribed by that curriculum. In this regard efforts were made to critically examine and compare the mathematics curriculum for primary education in Bangladesh and West Bengal.

From the comparison of the objectives of mathematics curriculum as prescribed by BNCTB with that of set of objectives of teaching mathematics of WBBPE, it was found that objectives of teaching mathematics set forth by WBBPE are more appropriate than that of BNCTB; because the set of objectives prescribed by WBBPE are more comprehensive, very specific and including higher level cognitive development of pupils (Refer item-1 in section- 6.2.1). In fact looking to the nature of mathematics subject as a discipline it is always advisable to include objectives that

take care of creativity, reasoning, application of mathematics concept in day-to day life and development of mastery among pupils in problem solving along with the knowledge and understanding of basic concepts of mathematics. In this regard it seems that objectives prescribed by mathematics curriculum of West Bengal are quite suitable to the need of pupils at this level.

It was found from the comparison of objectives of mathematics curriculum for both the countries (vide-table-4.1, p.56) that all these objectives; suitable to the nature of mathematics subject as a discipline are included in the set of objectives prescribed by WBBPE. In spite of this, the major findings related to mathematics curriculum (Refer section-6.2.1 and table-4.1) indicate that none of the sets of objectives (prescribed in curriculum of both the countries) are at par with the standard set of objectives as prescribed by the experts of RCDICMDCA. It is found that the objectives:

- Development of intuitive geometrical notions,
- Ability to draw appropriate inferences from patterns of numbers, reading and writing of pictographs, tables etc.

of standard set (prescribed by RCDICMDCA) help the pupils to learn exact geometrical forms from the learners' own environment and stimulate the development of spatial perception through intuition. These two objectives do not find the place in BNCTB and WBBPE curriculum. Hence, it seems that there is no scope for the pupils (of both the countries) at primary level to learn exact geometrical forms from own environment and stimulate the development of spatial perception through intuition, which is very much needed at this level. Such omission of these objectives could lead to ineffectiveness of mathematics curriculum. It is also observed that all the objectives of standard set are very much related to all-round development of pupils which is one of the main purposes of primary education whereas all the objectives of BNCTB have been given emphasis on the development of skills (mainly problem solving) and scientific attitude among the pupils. So, considering overall discussion, it could be said that objectives of BNCTB require modification to a great extent while the set of objectives prescribed by WBBPE may be extended further by adding objectives to match the standard set of objectives prescribed by RCDICMDCA.

It is also found that objectives of mathematics curriculum in West Bengal are giving specific direction to the text book writers (for deciding content of the textbook)

and teachers (which illustrations to be given and when) while objectives of mathematics curriculum of Bangladesh are not much directive to suggest the specific guide lines to textbook writers (for deciding content of the textbook) and teachers (which illustrations to be given and when) (Refer item-2 of section-6.2.1). Such specific direction always helps the teachers to design the specific activities for teaching mathematics content in classrooms; encouraging the pupils for more interaction leading to the active participation of pupils in mathematics class with interest to *a great extent*. May be, this could be one of the reasons that induced pupils' participation to *a great extent* (44.8%) in West Bengal compared to only 5% of pupils' participation to *the great extent* in Bangladesh (refer item-6 of column D in table-6.1).

School mathematics syllabus might ostensibly be similar in different societies, but the arrangement of the content and the approach to particular topics could be very different (ICMI, 2000, 108). The present study supports this as the findings imply that (Refer item-4 in section-6.2.1) there are six learning areas of BNCTB textbooks which were found across the grades I-V. These areas are: 'manipulation of concrete objects and counting', 'number and numeration', 'four fundamental operations', 'day-to-day life problems', 'pictorial representation of data', and 'geometry'. While on other hand; five learning areas of WBBPE textbooks content are found across the grades I-V. They are: 'number and numeration', 'four fundamental operations', 'day-to-day life problem', 'pictorial representation of data', and 'geometry'. Here, grade-wise distribution of topics is different. e.g. mean, 'LCM and HCF' are completely included in grade -V textbook of BNCTB. The same are included in grade-IV textbook of WBBPE. Geometry is distributed spirally in grades II-V textbooks of BNCTB. The same is distributed in grade IV and V textbooks of WBBPE. However, findings indicate that more emphasis is given on spiral type of organization of the content in textbooks of both the countries. Comparatively, WBBPE has given more emphasis on spiral method than BNCTB.

There are similar kind of problems for learning faced by pupils (in both the countries) such as word problems involving addition and subtraction that have been included in grade-I for the pupils of Bangladesh and West Bengal of India (Refer item-7 of column-A in table-6.1). This finding indicates that word problems may be deleted from grade-I because it is not the appropriate age to develop the pupils' ability to acquire knowledge independently through problem solving. At this stage the most

appropriate way for pupils to learn mathematical concepts is manipulation of objects and understanding the concepts through reading, writing and vocabulary of numbers. Experts of regional workshop on mathematics education (UNESCO-NIER, 1983) pointed out that manipulative and computational skills and other techniques are necessary as a background to problem solving.

Geometry is distributed spirally in grades II to V as considered by BNCTB and the same is distributed in grades IV to V textbook content as considered by WBBPE. In this context curriculum specialists (50%) (Refer section-5.4.4.5) and all subject specialists (Refer section-5.4.3.6) of west Bengal opined that partial development of concepts about basic geometrical figures have been included in the textbook. The finding indicates that in textbooks of West Bengal geometry may be included spirally among the grades II-V. Because, geometry is an important component of mathematics at all levels and it stimulates the development of spatial perception (Hohmann, 1991, UNESCO-NIER, 1983), it is very much appropriate to have spiral distribution of geometrical concepts as given in West Bengal textbooks. Also it is very important for understanding every day to day life experiences of pupils and helpful to identify the 3-dimensional objects.

The content list of a subject always directs about the content / topics included in the textbook. Looking at the content lists of the textbooks of BNCTB, it seems that authors have not adopted any uniform policy regarding the split of the content list. Content lists of grades I & II are splitted into lesson only. The total spread of the topics included in the list of contents of grade-III textbook does not make mention of the units/lessons under which these topics fall. Grades IV-V content lists of the textbooks are divided into units only. On the other hand, looking at the content lists of the textbooks of WBBPE, it seems that authors have adopted uniform policy to split the content list. The content lists have been splitted first into units and then every unit sub-divided into lesson.

The textbook commands a central role in the transaction of a curriculum and the instructional activities get centred on the textbook. The textbook comes to serve as a comprehensive source of information (Goodlad, 1984). According to NCERT (1990) learning objectives should be stated at the beginning of each unit. The analysis of textbooks (grades I-V) of Bangladesh revealed that learning objectives/purposes have not been stated in corresponding units. The presentation of the topic in each unit is appropriate at later stage but the presentation of introduction is not very attractive.

Of course, in some of the lessons / units like comparison of numbers in grade I & II, place value in grade-III, fractions in grade-IV was with practical illustrations and easy to understand. The main introduction could have been made more effective by adding some entry behaviour questions or giving interesting illustrations from day to day life.

The analysis of textbook of WBBPE lead to the finding that learning objectives/purpose have been stated in each lesson/unit (except grade-V) (Refer item-7 in section-6.2.1); the same fact builds one of the aspects of the strengths of mathematics curriculum of West Bengal (Refer item-14 of column B in table-6.1) as according to academic supervisors it helps the teachers to suggest how to introduce the lesson for better comprehension of the pupils.

The next important aspect is whether textbooks were successful in establishing proper communication between them (books) and the users. Textbooks are supposed to speak to the learners and this is possible only if the language used in the textbook is easy. According to Patadia (1983) the language used for the explanation of the topic should be simple and very informal. There is a general agreement among the Asian countries that at least in the lower elementary classes, mathematics should be taught in the mother tongue (UNESCO-NIER, 1983). Mathematics textbooks of grades (I-V) of Bangladesh and West Bengal of India have used Bengali language. So it is easier to understand for the children of both countries. The finding of this study indicates that the language used in the textbooks of Bangladesh and West Bengal is easy and simple (except unit six of grade-I in West Bengal) (Refer item-11 in section-6.2.1). In addition to this the primary mathematics teachers (63%) from West Bengal have categorically mentioned that pupils find difficulty in understanding the language used in textbook for mathematics problem solving, while the academic supervisors from West Bengal identified specific content areas (such as concept of zero (0), multiplication and division) which contribute towards weakness of the curriculum due to the complex language used for the explanation of these areas. Enough care should have been taken to make the presentation of these mathematical concepts easy to be understood by the users.

Illustrations given in any textbook play vital role for textbook reader. A proper illustration helps in enhancing the understanding of the content. Illustrations need to be selected on the basis of relevance, quality and quantity (Chiapetta and Collette, 1984). The purpose of the illustrations is to aid in explaining concepts or examples or conveying some information in an interesting way. It was found that illustrations in

the textbooks of Bangladesh and West Bengal of India are relevant, clear and adequate to the age group of pupils. Colourful pictures for grade-I, colourful and 'black and white' pictures for grade-II, 'black and white pictures', diagrams, tables and graphs for grade III-V are included in the textbooks of Bangladesh and West Bengal of India. Comparatively, more pictures, diagrams, graphs and tables are included in the textbook of Bangladesh than that of West Bengal (Refer item-8 in section-6.2.1) that helps to induce interest among the learners.

The socio-cultural aspects are also very important factors which need to be integrated in any textbook for better understanding of mathematical concepts. It was found that the socio-cultural aspect of each society (of both the countries) is well integrated through illustrations in mathematics textbooks of both the countries at primary level. 32% teachers from Bangladesh responded that the socio-cultural aspects were reflected in grades I-III through the 'concept of number'; in grades I-V through the 'concept of currency', 'time' and 'four fundamental operations'; in grades III-V through the 'concept of measurement', 'geometry' and 'word problems' ; in grade-V 'capital-expenditure', 'cash-memos' and 'graph'. In West Bengal, 33% teachers opined that socio-cultural aspects are reflected in the mathematics content areas in grades I-III through the 'concept of number', 'currency'; in grades I-IV through 'four fundamental operations'; in grades II-V through 'measurement', 'fractions', 'decimals'; and in grade-V through 'unitary method', 'percentage' and 'geometry' (item-14 of column-A in table-6.1). This is also supported by the experts (curriculum and subject specialists) and academic supervisors (Refer column- C and B) of both the countries. According to them, more or less similar mathematical topics from the textbooks of both the countries reflect socio-cultural aspect of the corresponding society. The representations of socio-cultural aspect in textbook of both the countries differ only in terms of the illustrations and the level (grade-wise) at which they are introduced (Refer item-4 of column C in table-6.1).

The exercises given at the end of each lesson of any textbook serve the purpose of evaluating the academic achievement of pupils. In this regard the textbooks of both the countries have taken enough care to examine the extent to which objectives prescribed in the mathematics curriculum are attained through the appropriate exercises. Here, it is worth mentioning that exercises included in the textbooks of WBBPE are given more systematically than that of BNCTB (item-10 in section-6.2.1). Also, as per the responses of academic supervisors of

west Bengal; well-graded, systematic and suitable exercises given at the end of each chapter contribute towards the strength of primary mathematics curriculum of West Bengal (Refer item-14 of column C in table-6.1 and section-5.3.15). Thus it seems that textbooks of West Bengal has taken more care for content presentation as well as evaluation aspect while textbooks of Bangladesh has more focus on content presentation and evaluation is neglected to some extent.

6.3.2 Discussion on teaching processes in mathematics classes of Bangladesh and West Bengal of India

The processes in mathematics classes are very much related to the transaction of curriculum done by mathematics teachers with the help of their basic knowledge of mathematics and methodology used in the classroom for mathematical instructions. The classroom teachers are one of the best media for implementing curriculum in the actual classroom situation. Better implementation of curricula materials depend on better quality of teachers and better quality of teachers may depend on their content knowledge and proper training.

Considering academic results and professional training of teachers, it seems that West Bengal mathematics teachers' scholastic achievement is higher than that of Bangladesh teachers (Refer item-1 of column-A in table-6.1). Further it may imply that in absence of enough mathematical background (of teachers in Bangladesh), training facilities should be extended for primary teachers of Bangladesh to improve the quality of teaching.

It was found that most of the teachers of Bangladesh (73%) are *not deputed* for in-service training while most of the teachers of West Bengal (67%) are *deputed* by authority for the in-service training programmes (Refer item-2 of column-A in table-6.1). Also, it was found that 79.17% of teachers of Bangladesh do not have any training on using of teaching aids and equipments. On the other hand, 58.33% of teachers of West Bengal have training on using of teaching aids and equipments (Refer 5.2.4). The findings indicate that there is a lack of facilities for in-service training programme in Bangladesh. This is supported by academic supervisors (52%) of Bangladesh (Refer section 5.3.9). Therefore, professional training facilities should extend for effective classroom teaching and developing the concept of mathematics as opined by teachers (94.17%) of Bangladesh (Refer 5.2.5).

On the other hand, the finding (Refer item-8 of column-B in table-6.1) indicate that academic supervisors of West Bengal organized in-service training for mathematics teachers more than that of Bangladesh academic supervisor i.e. in-service training facilities are found more in West Bengal than that of Bangladesh. Hence it seems that there is an adequate facility for in-service training in West Bengal. However, teachers (63.33%) of West Bengal pointed out that training facilities should be extended, especially for developing the efficiency and skills of teaching, to train mathematics teachers with the easiest, scientific and latest teaching techniques (Refer 5.2.5). This indicates that in spite of the available training programmes, primary mathematics teachers (of West Bengal) are interested to have more vigorous training in light of the latest development and modernization taking place in this field.

Teachers from Bangladesh (73%) and West Bengal (33%) opined that one of the main barriers for in-service training programme is 'shortage of mathematics teachers in the schools' (Refer item-3 of column-A in table-6.1). The finding (Refer item-17 of column-A in table-6.1) indicates that teachers of Bangladesh have given more suggestions in context of training compared to that of West Bengal teachers suggestions. Also, 53% teachers from Bangladesh have given suggestions in context of recruitment of mathematics teachers who have studied mathematics (Refer item-18 of column-A in table-6.1). Looking to the percentage of opinions and suggestions given by the teachers of Bangladesh it is clear that 'shortage of mathematics teachers' in the schools of Bangladesh is a problem to a large extent than in West Bengal. Also academic supervisors of Bangladesh pointed out that shortage of mathematics teachers contributes towards weaknesses of mathematics curriculum (Refer item-15 of column-B in table-6.1). In addition to this academic supervisors of Bangladesh have given more suggestions in context of training and recruitment compared to that of West Bengal academic supervisors' suggestions (Refer item-16 of column-B in table-6.1). Also curriculum specialists support this (Refer item-8 of column-C in table-6.1) by opining that one of the weaknesses of Bangladesh mathematics curriculum is lack of teachers' proficiency in mathematics. Also curriculum specialists and subject specialists of Bangladesh suggested to strengthen in-service training and appoint only such mathematics teachers who themselves have studied mathematics (Refer item-9 of column-C in table-6.1).

This means that the lack of mathematics teachers in the schools of Bangladesh results into poor quality of transaction of the mathematical content at primary level in absence of mathematical background of teachers. This indicates the need for well trained mathematics teachers at primary level in Bangladesh with sound background of mathematics subject.

One of the reasons for this scenario could be the recruitment policy of Bangladesh that leads to the unavailability of enough number of primary mathematics teachers resulting into poor transaction of mathematics curriculum. Rahman (2000) recommended in his study that recruitment and placement policies of primary teachers should be revised in Bangladesh provision with a placement of specific numbers of teachers with sound science background in each school.

It is rightly said in one of the government documents of Bangladesh (Government of Bangladesh, 1992; 66) that changes in school curricula and syllabi and changes in educational theory and teaching methodologies necessitate exposure to new ideas and opportunities of continuing education for teachers. In fact, one way of providing opportunities to update the knowledge of teachers is through in-service training programmes. Thus the need of in-service training programmes and recruitment policy (of appointing enough number of teachers) can not be sidetracked by any nation. It was found that the quality in terms of academic degrees and professional training of the mathematics teachers in the schools of Bangladesh is not very encouraging in general.

A proper planning of the lesson is one of the keys to effective teaching. This planning will give the teacher an idea of how to introduce the topic, how to develop the key concepts, how to correlate the concepts to real life situations and how to conclude the lesson (Kumar, 1993). The findings based on questionnaire given to the teachers indicate that the daily lesson plan used more by the teachers of West Bengal (72%) for teaching mathematics than that of teachers of Bangladesh (54%). (Refer item-12 of column-A in table-6.1). But through classroom observations, it was found that majority of mathematics teachers (96.6%) from Bangladesh neither use the lesson plan nor the out line of plan for teaching in the classroom while mathematics teachers in West Bengal (73.4%) neither use the lesson plan nor the out line of lesson plan for teaching in the classroom (Refer item-2 of column-D in table-6.1). Thus it implies that a meagre number of teachers from West Bengal used lesson plan during the teaching in class while the daily lesson planning by the teachers of Bangladesh for

teaching mathematics is almost absent. According to academic supervisors, it was found that teachers of West Bengal are more systematic and regular than the teachers of Bangladesh with respect to use of lesson plan for teaching as a prior preparation for classroom teaching (Refer item-9 of column-B in table-6.1). The ultimate success of any classroom learning situation depends mainly on the preparation of the teacher (in terms of planning) prior to actual teaching in classroom.

In lesson plan teacher designs the strategy for teaching; keeping in mind various methods, approaches and resources to be utilized during the actual practices in classroom. During classroom observations of teaching practices, investigator observed the introduction to a mathematical topic, methods/approaches and teaching aids used by the primary mathematics teachers. It was found from classroom observations that 45% teachers from Bangladesh introduced their lessons with reference to previous knowledge of the pupils while 43.4% teachers did not use previous knowledge for introduction of the lesson. In contrast, a vast majority of teachers from West Bengal (87%) introduced the lesson based on the previous knowledge of the pupils and the relevant activities (Refer item-4 of column-D in table-6.1) to prepare the platform for teaching and learning of the mathematical concept to be taught. It was also found that pupils' participation and pupils' response in classes of West Bengal were satisfactory in comparison to Bangladesh classes (Refer item-6 & 7 of column-D in table-6.1). The reason behind this could be the introductory teaching approach. It was found that 45% teachers in the schools of Bangladesh adopted the teaching approach from general to specific while 58.4% teachers of West Bengal adopted the teaching approach from concrete to abstract while teaching respective topics (Refer item-5 of column-D in table-6.1). The approach from concrete to abstract seems to be more scientific and appropriate for the pupils at primary level. This further implies that teaching approach utilized by teachers of West Bengal is more scientific and appropriate than teachers of Bangladesh.

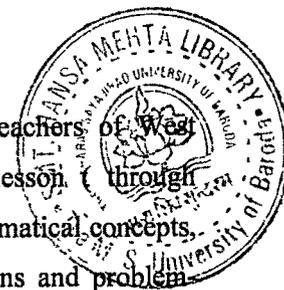
Also, it was observed that on an average 71.8% mathematics teachers in the schools of Bangladesh did not summarize the lesson while teaching. On the other hand, it was found that 86.6% mathematics teachers in the schools of West Bengal summarized the lesson at the end of the class through questioning and problem solving while teaching (Refer item-13 of column-D in table-6.1). Summarizing the lesson at the end of the class through questioning is one of the important techniques to consolidate the knowledge gained by the pupils during that period and make them

curious for next lesson. Thus strategy utilized by mathematics teachers of West Bengal starting from introduction of lesson up to the end of lesson (through summarization) helps them to teach effectively by connecting mathematical concepts, ideas and applications through various concrete examples, questions and problem solving integrated with different teaching skills and methods. From this it is obvious that teaching-learning processes in West Bengal classrooms are more effective than that of Bangladesh.

Pupils were asked to do work in the classroom or at home by the teachers from both countries (Refer item-11 & 12 of column-D in table-6.1). Classroom / Home task is one way of involving pupils actively in their learning of mathematics. This is an effective vehicle for teachers to find out what do their pupils understand! It is also giving feedback to the pupils about 'what have they learnt!', 'how to make discoveries on their own!' and what do they not understand!' (Artzt and Thomas, 2002; 179). In both the countries classrooms assignment and homework given to pupils is quite suitable to the pupils at that level.

A variety of resources should be used in the teaching and learning of mathematics in order to achieve better outcomes. However, it was found that textbooks constitute the main resource for teaching and learning (Refer item-3 of column-D in table-6.1) as it was pointed out in UNESCO-NIER Regional Programme-1983. On the whole, this regional programme-1983 felt that the use of textbooks has been dominating the teaching and learning of mathematics. It is decided that steps be taken to encourage teachers to use more widely other learning resources.

The findings based on questionnaire given to teachers show that majority (91%) teachers of Bangladesh and 71% teachers of West Bengal had teachers' manual on teaching mathematics. 92% teachers of Bangladesh felt that teachers' manual is necessary to teach mathematics effectively. On the other hand, 79% teachers of West Bengal opined that teachers' manual is not necessary to teach mathematics effectively. Further 17% teachers of Bangladesh opined that some more information is needed in teachers' manual while 25% teachers of West Bengal opined that some more information is needed in teachers' manual (Refer item-11 of column-A in table-6.1). From these views related to the teachers' manual it is obvious that a large number of teachers from Bangladesh are having teachers' manual, are in favour of using the same and only a few of them suggested modification in existing teachers' manual. On other side a good number of teachers from West Bengal are having



teachers' manual, are not in favour of using the same and a considerable number of teachers suggested modification in existing teachers' manual. This indicates that existing teachers, manual of Bangladesh is inclusive of sufficient information to teach mathematics effectively than that of West Bengal manual.

Mathematics learning should be imparted through teaching aids from the very beginning of school education, i.e., from the primary stage itself. The activities using teaching aids may involve the use of concrete materials, models, patterns, charts, pictures, posters, games, puzzles and experiments. The importance of using learning aids needs to be stressed (NCERT, 2000) to make the lesson effective, interesting and facilitate better understanding of the lesson by the pupils. The findings indicate that teachers from both countries used similar kind of teaching aids such as abacus, sticks, marble, flowers, pencil, chalk, duster, pipe, meter, weight, bread, folding paper, potato, scale, stone, scale-pan, books, table, kite, balloon, protractor, compass, divider, chart, prescribed picture in textbook while teaching respective topics [Refer tables 5.4 (a) to 5.4 (e)].

The findings based on teacher's responses indicate that by and large, the use of teaching aids was more by the teachers of West Bengal with compared to the teachers of Bangladesh (Refer item-6 of column-A in table-6.1). The findings also indicate that teachers from West Bengal used some innovative teaching aids such as pocket board, bullet (made by soil), flashcard and woodblock and plastic number etc (refer section 5.2.6). This evidence strongly indicates that West Bengal teachers are more conscious for using teaching aids to make the lesson effective, interesting than that of Bangladesh. Also, from class observation, it was found that 10% teachers from Bangladesh and 45% teachers from West Bengal used teaching aids. May be due to this reason more pupils in West Bengal observed keenly and asked the questions frequently in classroom. It was also observed that 90% teachers from Bangladesh and 55% teachers from West Bengal did not use teaching aids at all while teaching respective topics. (Refer item-10 of column-D in table-6.1). The result could raise serious questions about the quality of schooling at primary school of Bangladesh when compared the using of teaching aids with that of West Bengal. Here it is notable that, most of the teachers in the schools of Bangladesh and West Bengal used blackboard. Thus by and large the resources used by the teachers in West Bengal are more compared to that in Bangladesh.

The aim of mathematics education is likely to be served more successfully by a consideration of the suitable methodology of teaching and learning. Curriculum statements and guidelines should therefore give attention to the methods and approaches by which the learning objectives of the curriculum might appropriately be achieved (UNESCO – NIER, 1983). Appropriate instructional strategies (NCERT, 1990) are expected to be adopted in the classroom (Cited in Umasree, 1999) which would lead to spread of mathematics teaching effectively. Finding shows that West Bengal teachers used ‘Problem-solving’ and ‘question-answer’ more than that of Bangladesh teachers (Refer item-9 of column-A in table-6.1). Also, this finding is supported by the classroom observations (Refer item-14 of column D in table-6.1).

There is no single best method for teaching all pupils for all mathematical concepts. Each pupil has an individually preferred learning style. It is suggested that pupils be exposed in their mathematics classroom to a wide variety of teaching and learning methods and approaches. It was found that teachers from both countries used wide variety of teaching and learning methods and approaches such as lecture, discussion, demonstration, problem-solving, question-answer, assignment and team-teaching generally or occasionally for some selected topics. This finding is also supported by classroom observation that teachers from both countries used these methods only one after another in the same period (Refer item-17 of grades –I to V in section 5.5 and section 5.2.13). The most important reason perhaps for promoting problem solving is to develop the pupils’ ability to acquire knowledge independently, that is, to encourage autonomy of learning.

6.3.3 Discussion on problems and obstacles in transaction of mathematics curriculum in Bangladesh and West Bengal of India

Teacher is responsible for transacting mathematics curriculum effectively in classroom situations. For effective transaction of the curriculum, both; the content of mathematics and teaching method; are important. The findings of this investigation strongly indicate that ‘lack of mastery in conceptual understanding of mathematics subject by the teachers’ is similar type of problem faced by teachers in classrooms of both the countries (Refer item-3 of column-B in table-6.1). This is also supported by the curriculum specialists from Bangladesh mentioning that the teachers’ lack of proficiency in mathematics subjects (Refer item-8 of column-C in table-6.1) contributes towards the weaknesses of transaction of mathematics curriculum in

Bangladesh. The reason behind this is that no primary teacher is exclusively categorized as mathematics teacher (Refer 5.2.3) as a result of this during the recruitment of primary teachers; enough care is not taken to give due weight-age for the selection of teachers with mathematics background. In previous section (Refer section 6.3.2) enough discussion is given along this line. Thus main problems and obstacles in transaction of curriculum in Bangladesh are unavailability of teachers with strong mathematical background, shortage of mathematics teachers (Refer item-3 of column-A in table-6.1) due to recruitment policy of the Bangladesh government (Refer section 6.3.2) and shortage of training programmes in Bangladesh (Refer section 6.3.2). So; for overcoming these problems and obstacles there is a great need of in-service training programmes (incorporating content, methodology and various approaches for teaching mathematics) for primary teachers in Bangladesh for effective transaction of the curriculum. Compared to this scenario of Bangladesh, in West Bengal the situations is far better in terms of the qualifications, mathematical background of primary teachers and the in-service training programmes (Refer item-1, 2 & 4 of column-A ; item-7,8 of column-B & section 6.3.2).

Teacher provides the important link between the pupils and the curriculum. To be effective in the teaching of mathematics, in addition to the up-to-date knowledge of the teacher and effective communication; the regular presence of pupils in the classroom is equally important. The finding based on responses of academic supervisors (Refer item-3 of column-B in table-6.1) indicates that ‘irregular attendance of learners’ is one of the common problems to transact mathematics curriculum in Bangladesh and West Bengal of India. Even though the ‘irregular attendance’ is a major hurdle in transaction of curriculum in both the countries, the intensity of this aspect is more in Bangladesh compared to West Bengal of India. The efforts should be made by the teachers to find out the reasons of irregularity of pupils in the classroom so that proper measures could be taken to increase the regularity of pupils.

The observations made by investigator in actual classroom situations (Refer item-10 of column-D in table-6.1) indicate that ‘insufficient use of teaching aids’ create the problem in effective transaction of mathematics curriculum more in Bangladesh compared to that in West Bengal. The same is supported by primary teachers (Refer item-6 of column-A in table-6.1) and academic supervisors (Refer

item-15 of column-B in table-6.1) which is already discussed at length in section 6.3.2; hence the same is not repeated here.

Anderson in his study found that pupils achieve significantly when the class-size is reasonably small and teacher has a less work load (Cited in Khan, 1985). According to academic supervisors, it was found that 'inappropriate teacher-pupil ratio' is found more in Bangladesh classrooms than that of West Bengal (Refer item-3 of column-B in table-6.1). According to teachers from Bangladesh and West Bengal of India; it was found that classrooms were over crowded specially in the urban areas (Refer item-16 of column-A in table-6.1) which contribute towards the weakness of primary mathematics curriculum of Bangladesh and West Bengal of India. The investigator found the same from classroom observation. It seems that overcrowded classroom and inappropriate ratio of teachers and pupils cause obstacles for effective transaction of mathematics curriculum.

National Committee (Bangladesh) on Education Policy, 1997 recommended that the ratio of teacher and learner should not be more than 1: 35 by any means in order to raise the standard of primary education. The class-size in Bangladesh is too large having 70 to 75 pupils on an average for grades one and two, 45 to 50 children for grades three to five. Subject specialists from West Bengal suggested that teacher-pupil ratio should be appropriate, i.e. no section should contain more than 40 pupils (Refer section 5.4.4.7). Government of West Bengal (1981) recommended that the ratio of teacher and learner should not be more than 1: 40 by any means in order to raise the standard of primary education. So it seems that no measures are taken in both the countries to maintain scientific ratio between teachers and pupils at primary level in real classroom situation to facilitate effective transaction of curriculum; even though the educational policy and documents in both the countries highlight the need for the same.

Teachers from Bangladesh (43%) and West Bengal (47%) indicated that the allotted periods are not enough for teaching of mathematics. They suggest for additional period for grade-wise mathematics teaching (Refer item-8 of column-A in table-6.1). The investigator has found from observations that on an average in West Bengal mathematics teachers get more time for teaching of mathematics (each periods of 35 minutes duration in grades I-II level and 40 minutes duration in grades III-V level) compared to the Bangladesh mathematics teachers (Refer item-1 of column-D in table-6.1) for teaching mathematics subject. In spite of this; the finding shows that

almost half of the teachers (47%) from West Bengal wished for more time duration to justify their teaching.

UNICEF (1993) reported that the total number of instructional hours in grades I-II in Bangladesh is very low compared to that in other Asian countries. Pupils are taught on an average 444 hours in Bangladesh compared to 1100 in Indonesia and 1235 in China (Cited in Vincent Greancy et. al. 1998). National Committee on Education Policy in Bangladesh(1997) proposed the minimum contact hours in classes one and two, and in classes three to five, assuming 230 working days in a year, should be at least 690 and 1,265 hours respectively (with half an hour's break for the last-quoted classes). Government of West Bengal (1981) recommended 228 working days for grades I-V in a year with minimum contact hours 646 for grades I &II, and 636 for grades III to V in a year. NCERT (2000) recommended minimum of 180 days in a year should be available for effective instruction. A primary school should function for five hours a day out of which four hours may be set aside for instruction. The duration of a class period may be around 40 minutes.

From the present scenario, it seems that in West Bengal the primary teachers get more time for teaching compared to that in Bangladesh. Educational policy documents in both the countries suggest the need for more contact hours for teaching at primary level than the actual contact hours practiced by the schools in both the countries.

Since, teachers have main responsibility to transact mathematics curriculum effectively in classrooms; they must possess clear understanding regarding the objectives of mathematics teaching, mathematics syllabi and evaluation procedure. However, the findings indicate that in West Bengal classrooms problems such as, 'teachers have no clear understanding regarding the objectives of mathematics teaching', 'no clarity of mathematics syllabi and evaluation procedure' were also prominent (Refer item-3 of column-B in table-6.1). One of the reasons behind this could be less use of teachers' manual in West Bengal (Refer item-11 of column-A in table-6.1). This indicates that academic supervisors of West Bengal should have taken enough care to monitor the proper use of teachers' manual made by primary teachers in West Bengal.

Academic supervisors are one of the important key factors to monitor and help the effective transaction of primary mathematics curriculum in classroom situations. Academic supervisors are involved directly for supervising, monitoring and training

of primary teachers. Their alertness in this task has direct impact on the quality of primary education. Looking to this fact and the findings based on responses of academic supervisors; it seems that only 38% of academic supervisors from Bangladesh and 60% of academic supervisors from West Bengal organize the in-service training programme for mathematics teachers (Refer section 5.3.9). Thus vast majority of academic supervisors from Bangladesh do not organize any in-service training programme, while the academic supervisors from West Bengal organize enough in-service training programmes for teachers (Refer item-8 of column in table-6.1). This scenario raises the question of concern for academic supervisors of Bangladesh for demand of more in-service training programmes for quality education at primary level.

Infrastructure facilities, punctuality of teachers and planning are important aspects to transact mathematics curriculum effectively. The findings indicate that infrastructure facilities i.e. adequate classroom facilities were poor in West Bengal with comparison to Bangladesh. During classrooms observations, the investigator has also found that inadequate number of classrooms in West Bengal (especially in rural areas) than that of Bangladesh. The finding (Refer item-9 of column-B in table-6.1) also indicates that teachers of West Bengal are more systematic and regular than that of teachers of Bangladesh with respect to use of lesson plan for teaching, prior preparation for class. It may be concluded that infrastructure related problems is more in West Bengal than that of Bangladesh. Punctuality and prior preparation related problems were found more in Bangladesh than that of West Bengal.

6.3.4 Discussion on major strengths and weaknesses of mathematics curriculum in Bangladesh and West Bengal of India.

Content analysis of the textbooks (Refer item-5 of section-6.2.1) shows that organization of content in the textbook of Bangladesh and West Bengal are a combination of both the topical methods and spiral methods. From the responses of academic supervisors in both the countries, it was found that the common strengths of mathematics curriculum for both the countries are skills development in mathematics, suitable content-areas distributed grade-wise spirally (in the textbooks) and sequencing the content from concrete to abstract with appropriate evaluation procedure (Refer item-14 of column-B in table-6.1). The same is also supported by experts of both the countries (Refer item-7 of column-C in table-6.1). According to

25% teachers from Bangladesh, the strengths of mathematics curriculum and its transaction are due to the class wise attainable competencies; content integration with the socio-cultural aspects; evaluation procedure and developing clear concept of the topics such as 'FFOs', 'fractions', 'numbers and numerals', 'unitary method', 'mean', 'LCM and HCF', 'measurement', 'percentage', 'capital-expenditure', 'graph' and 'time' and their applications to daily life. On the other hand, 63% teachers from West Bengal indicated that innovative teaching, chalk and talk policy used minimally in the classroom, stimulates the learners' logical thinking, content sequentially arranged class wise, use of low-cost materials for teaching-learning activities, helpful in the application of mathematics in real life situations, helpful for children to develop an understanding from the specific to general, plays a key role in integrating science with other subjects and scientific base of existing mathematics curriculum are the strengths of mathematics curriculum and its transaction (Refer item-15 of column-A in table-6.1).

The academic supervisors, curriculum specialists and subject specialists agreed upon unanimously (Refer item-14 of column-B & item-7 of column-C in table-6.1) that content integration with socio-cultural aspects (details discussion are given in section 6.3.1) and its presentation through the textbooks form one of the major strengths of the curriculum.

In addition to above mentioned strengths, it is found that pictorial presentation of the content (Refer section-6.3.1), emphasis on basic learning skills such as listening, speaking, reading and writing; and programmes adopted to promote up-to-date curriculum are the major strengths of mathematics curriculum of Bangladesh (Refer item-14 of column-B in table-6.1).

In West Bengal other major strengths of mathematics curriculum are introductory discussion, inclusion of revision chapter related to previous grades of the textbook, up-to-date textbooks, exercise at the end-of-chapter and word problems involving four fundamental operations from numeric to statement and vis-à-vis (Refer item-14 of column-B in table-6.1 & section-6.3.1).

25% teachers from Bangladesh and 63% teachers from West Bengal (Refer item-16 of column-A in table-6.1) identified similar types of areas of mathematics curriculum such as 'inadequate number of teaching aids used' and 'classroom highly crowded in the urban areas' which contribute towards the weaknesses of mathematics curriculum and its transaction. This is also supported by academic supervisors (Refer

item-15 of column-B in table-6.1), experts (Refer item-8 of column-C in table-6.1) and classroom observation (Refer item-10 of column-D in table-6.1) in both the countries. Also, according to the teachers of both the countries complex and complicated mathematical problems (such as word problems related to multiplication, division; geometry etc.) (Refer item-16 of column-A in table-6.1) are considered as weaknesses of mathematics curriculum. This is also supported by subject specialists of Bangladesh and curriculum specialists of West Bengal (Refer item-8 of column-C in table-6.1). Thus it seems that major weaknesses of the curriculum and its transaction in both the countries are due to the overcrowded classrooms, lack of inadequate teaching aids for teaching mathematics, complicated and complex word problems not suitable for the age group of children at primary level

In addition to this, 25% teachers from Bangladesh identified that the weaknesses of mathematics curriculum and its transaction are due to the deficiency of in-service training facilities; insufficient concept clarification of topics such as 'metric system', 'simple interest' and 'area of triangle' for usage in daily life (Refer item-16 of column-A in table-6.1). At different places, the primary mathematics teachers and academic supervisors have shown great concern to conduct in-service training programmes for mathematics teachers at primary level in Bangladesh (Refer section 6.3.2). In addition to this, even though a small number of teachers from Bangladesh(25%) clearly mentions that deficiency of in-service training facilities (Refer item-16 of column-A in table-6.1) contributes towards the weakness in transaction of mathematics curriculum, it should be taken seriously by all concerned people of Bangladesh in the system of implementing the in-service training programmes for mathematics teachers.

Roy (1986) mentioned that Standard of education depends on the standard and effort of the teachers and teachers' performance depend on standard curriculum. Academic supervisors from Bangladesh identified areas of the mathematics curriculum which contributes towards weakness of the curriculum such as: resources (mathematics teachers and time for teaching the syllabi); lack of appropriate methodology, techniques and activities utilized by the teachers for transaction of curriculum (Refer item-15 of column-B in table-6.1). Curriculum specialists' opined that due to teachers' lack of proficiency in mathematics, give less illustrations in classroom; as a result, mathematics curriculum is not being implemented properly. Subject specialists from Bangladesh opined that lack of content articulation from

grade-II to III is the major weaknesses of mathematics curriculum (Refer item-8 of column-C in table-6.1). From this it seems that academic supervisors and experts of Bangladesh also point out at teaching methodology, techniques, appropriate use of resources and requirement of sufficient time for the effective transaction of the mathematics curriculum which is not the case in present situations. All these aspects (methodology, resources etc) that contribute towards weaknesses in transaction of mathematics curriculum in Bangladesh, are closely related to the training programmes of primary mathematics teachers. Hence from this point of view; the conduction of sufficient number of in-service teacher's training programmes is very important.

63% teachers from West Bengal indicated that 'difficult content' for grade I and II; difficulty in understanding the language used in mathematics problem solving (given in text) by the pupils; lack of interest shown by pupils in learning some topics of mathematics such as 'change of units' and geometry, contribute toward the weaknesses for effective transaction of mathematics curriculum (Refer item-16 of column-A in table-6.1). Academic supervisors from West Bengal identified areas of the mathematics curriculum which contributes towards weakness of the curriculum such as: complex language used for explanation of some topics (e.g. concept of zero, multiplication, division, etc.) in textbooks for grades I-V; less attractiveness of the textbooks (Refer item-15 of column-B in table-6.1). According to West Bengal curriculum specialists, ignorance of play way method, more content coverage in short period, less geometry (details discussion are given in section- 6.3.1), are considered as weaknesses of mathematics curriculum. Subject specialists indicate that no attempt to organize content from concrete to abstract, insufficient explanation of the concept of number, lack of clarity given for similar and dissimilar things are the major weaknesses (Refer item-8 of column-C in table-6.1). The overall picture of these findings suggest that as per the different views given by teachers, academic supervisors and experts, the language used in the textbooks and less attractive textbooks contribute towards the weakness of mathematics curriculum in West Bengal. Further this could be one of the reasons for pupils' lack of interest in mathematics classrooms in West Bengal.

6.4 Conclusion

On the basis of above discussion made in subsections 6.3.1, 6.3.2, 6.3.3 & 5.3.4; the following conclusions are drawn:

1. The set of objectives prescribed by WBBPE is better than the set of objectives prescribed by BNCTB in terms of knowledge, skills, understanding and specific direction to the textbook writers and teachers. But none of these sets of objectives are at par with the standard set of objectives as prescribed by the experts of RCDICMDCA.
2. Content-areas included in mathematics textbooks of both the countries are almost similar, easy to understand and given in regional languages (of both the countries) but the grade-wise distribution of topics differ in the textbooks of Bangladesh and West Bengal.
3. Inclusions of introductory discussion, learning objectives/purpose and the exercises given in each lesson/unit in the textbooks of West Bengal are presented systematically and more effective than that of Bangladesh. However pictorial presentation of contents in the textbooks of Bangladesh is more compared to that of West Bengal.
4. Word problems included in textbooks at grade-I level cause the understanding problems for the pupils in Bangladesh and West Bengal according to the views presented by the teachers, academic supervisors and experts in both the countries.
5. In both the countries more emphasis is given on spiral type of organization of the content in the mathematics textbooks however the focus of this organization for different topics varies in the textbooks of both the countries e.g. geometry is spirally distributed in grades-II to V textbooks of BNCTB while the same is distributed in grades-IV to V textbooks of WBBPE.
6. The recruitment of primary mathematics teachers in West Bengal is more

compared to that in Bangladesh and the scholastic achievement of mathematics teachers in West Bengal is much higher compared to that in Bangladesh.

7. In Bangladesh the in-service training programmes for primary mathematics teachers are not enough in number while that in West Bengal are enough.
8. In spite of enough number of in-service training programmes for primary mathematics teachers in West Bengal, the teachers asked for more such programmes which would include the latest teaching techniques used for teaching mathematics.
9. Primary mathematics teachers of West Bengal are using lesson plan to the greater extent very systematically and regularly than the teachers of Bangladesh.
10. Teaching processes in the actual mathematics classrooms (carried out by teachers) of West Bengal are far better, scientific, systematic and effective than that of Bangladesh.
11. Sufficient informations are provided in the teachers' manual of Bangladesh encouraging the teachers to make use of it for effective teaching while insufficient informations are provided into teachers' manual of West Bengal discouraging the teachers to use the manual for effective teaching.
12. The use of teaching aids by the teachers in West Bengal for helping the learner for quicker and better comprehension of mathematical concepts is comparatively more than that in Bangladesh.
13. Teachers of both the countries used different methods (such as question-answer method, problem-solving method, discussion method, etc.) except discovery approach.
14. Problems and obstacles are found more in transaction of mathematics curriculum in Bangladesh than that of West Bengal due to less qualified

teachers, lack of mathematical background of primary teachers and the shortage of in-service training programmes in Bangladesh.

15. The intensity of 'irregular attendance' of pupils in the classroom is more in Bangladesh compared to West Bengal of India which also creates problem for effective transaction of mathematics curriculum at primary level.
16. 'Teacher-pupil ratio' and 'contact hours' are not enough for effective transaction of the curriculum in both the countries.
17. Inadequate number of classroom is found in West Bengal compared to Bangladesh.
18. Strengths of mathematics curriculum of both the countries are:
 - skill development in mathematics
 - suitable content-areas distributed spirally grade-wise (in the textbooks)
 - content integration with socio-cultural aspects
 - sequencing the content from concrete to abstract with appropriate evaluation procedure
19. In addition to the above strengths; the mathematics curriculum of Bangladesh has following strength:
 - pictorial presentation of contents in textbooks
20. In addition to the strengths given under number 18; the mathematics curriculum of West Bengal has following strength:
 - inclusion of revision chapter; introductory discussion, learning objectives/purpose given in the beginning and exercises given at the end of each lesson/unit in the textbook systematically and suitable to the age group of primary level pupils.
 - up-to-date textbooks.
21. Weaknesses of mathematics curriculum of both the countries are:
 - word problems

- inadequate number of teaching aids used
 - classroom highly crowded in the urban areas
22. In addition to the above weaknesses; the mathematics curriculum of Bangladesh has following weaknesses:
- deficiency of in-service training facilities
 - insufficient concept clarification of topics such as ‘metric system’, ‘simple interest’ and ‘area of triangle’ for usage in daily life.
 - methodology used in classroom.
 - availability of resources and its use.
23. In addition to the weaknesses given under number 21; the mathematics curriculum of West Bengal following weaknesses:
- difficulty in understanding the language used in mathematics problem solving (given in text) by the pupils

6.5 Suggestions

1. The objectives of mathematics curriculum of Bangladesh needs to be revised and modified in the light of objectives of standard set prescribed by RCDICMDCA.
2. West Bengal Board of Primary Education may think of extending the set of objectives given in the curriculum, in light of the following two objectives given by RCDICMDCA to learn exact geometrical forms from own environment and stimulate the development of spatial perception through intuition, which is very much needed at this level.
 - ◇ Development of intuitive geometrical notions,
 - ◇ Ability to draw appropriate inferences from patterns of numbers, reading and writing of pictographs, tables etc.
3. Word problems should be deleted from grade-I mathematics textbook of both the countries as it is not suitable for the age group of pupils at this level. Also ‘Manipulation of concrete objects and counting’ should be included in the

textbook (grade-I) of West Bengal which is already present in textbooks of Bangladesh.

4. Geometry should be included spirally among the grades II to V in the textbooks of West Bengal.
5. Bangladesh should adopt uniform policy to split the content lists in the mathematics textbooks for grades - I to V.
6. Purpose of the lesson /unit should be written in the every unit of the textbooks of Bangladesh. Also introduction to each topic in the mathematics textbooks (grades-I to V) of Bangladesh should be included in an interesting way.
7. At the end of each chapter, exercises should be included in the mathematics textbook of Bangladesh systematically.
8. More pictorial presentation should be included in the textbooks of West Bengal to make the learning more interesting and easy to understand.
9. Recruitment and placement policies of primary teachers in Bangladesh should be revised in the light of availability of enough teachers with sound mathematical background in primary schools.
10. More in-service training programmes should be conducted for mathematics teachers of Bangladesh.
11. In spite of enough number of in-service training programmes in West Bengal, looking to the need of primary mathematics teachers and the latest development and modernization, latest technique of teaching with IT could be included in the available training programmes of West Bengal.
12. Primary mathematics teachers of Bangladesh needs to prepare lesson plan prior to the actual teaching in the classrooms and the same needs to be monitored by the academic supervisors for improving the quality of teaching.

13. Bangladesh teachers need to improve their practices in actual classrooms for teaching mathematics effectively with the appropriate use of teaching aids and suitable methodology of teaching mathematics.
14. Sufficient information should be incorporated in teachers' manual of West Bengal to help and encourage the teachers for making the use of the manual for effective teaching.
15. Teachers of Bangladesh and West Bengal may incorporate discovery method at the primary level for mathematics teaching as it is one of the best methods suitable for teaching of mathematics which helps the learner to develop imagination and understand the abstract mathematical concepts.
16. The efforts should be made by the teachers of both the countries to find out the reasons of irregularity of pupils in the classroom so that proper measures could be taken to increase the regularity of pupils in the classroom for learning mathematics.
- (17) Implementation of more 'contact hours', and 'small teacher-pupil ratio' in real classroom situations of both the countries are needed for effective transaction of mathematics curriculum.