Chapter-VII

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7.1 Introduction

Education is a pre-condition to national development and is now considered a birth right of every member of the society. Primary education has been identified and recognized as the starting point for the development process and it is the foundation for the entire educational edifice (Akand and Hoque, 1986).

In any national scheme of development, primary education should be given the highest priority and importance. (Purkait, 1984). Its significant effects on reduction in poverty and improvement in income distribution, improvement in health and nutritional status of the population, its negative relationship with fertility and population growth, and positive association with adoption of family planning methods, and its positive relationship with general social, political and economic development, and overall quality of life are well recognized.

In every national education system, mathematics occupies a position of central importance in the curriculum, and enormous resources are expended annually to ensure that future citizens are properly equipped for the demands of tomorrow's world (Sidher, 1971).

Mathematics, at the primary stage of education has emerged as a major academic priority, particularly in the context of the changing needs of society today and the constant exposure to the vast amount of quantitative data and challenges of technological advancement. A sound and solid foundation in mathematics, therefore, becomes a major concern. In view of the academic demand for providing the child a solid foundation in mathematics in the early years, the need to accelerate in the children development of the prerequisite skills and concepts becomes essential (Kaul. and et.al., 1995). It is a body of ideas structured by logical reasoning. The importance of mathematics, thus, in the present civilization is beyond any doubt.

Comparing, of course, is one of the most basic of conscious human activities: we necessarily and constantly compare in order to make choices and to judge where we stand in relation to others and to our own past (Alexander, 2000). Comparative studies in mathematics education have impact on several areas of education including debates about educational policy, instructional methods, and the effects of socio-

cultural factors on education (Plomp and Loxley, 1993). There have been great changes in recent decades in mathematics curricula all over the world. Many countries have reformed their mathematics programmes to keep pace with the current developments in various fields of education and technology. Any attempt at reform would take into account local conditions which can vary from one country to another. Nevertheless, reform in all countries finds common difficulties which can be overcome by using the same methods (Aram, 1986).

The Universality of the teaching of mathematics is a recognized fact. Perhaps no other subject is taught so universally as mathematics and the syllabi, methods and objectives of teaching this subject are quite similar in different countries of the world. The nature of the subject is such that it would easily lend itself to the promotion of inter-cultural understanding.

It is felt that to understand the nature of primary mathematics curriculum in Bangladesh and India; it would be very helpful to give a brief description of the education system in Bangladesh and India.

7.2 Education System of Bangladesh

Bangladesh inherited its education system from the British rule in India which was initiated in 1854 through the popularly known 'Wood's Education Dispatch' (Government of Bangladesh (GOB), 1998). The present education system of the country is more or less a modified version of the one prevalent in the colonial system. After Independence in 1971, some changes have been made as per recommendations of different commissions. Important among these is Bangladesh Educational Commission 1974, popularly known as Kudrat-E-Khuda Commission.

Bangladesh follows centralized curriculum system, where all the schools are required to follow the same plan throughout the country. The government has direct control over the establishment and management of school curriculum to be used nationwide. Boards of Education and Concerned Directorate of Education are responsible for academic control and management of the system, within the framework of laws and regulations determined by the government. The Bangladesh National Curriculum and Textbook Board (BNCTB) develop curricula and syllabi for the whole school system starting from grade 1 to grade 12.

The formal education in Bangladesh begins with 5-year primary education which is followed with 3-year lower secondary (junior high school), 2-year of secondary and 2 -year of higher secondary education. The University education comprises of 3 / 4-year Bachelor degree followed by 1 / 2-year Master's. Without repetition in any grade or loss of any academic year due to any reason, a boy or a girl taking admission to grade-I of a primary school at the age of 6 should expect to get his/her M.A. / M.Sc. degree at 22/23 years of age.

The task of reviewing and redesigning primary curriculum were initiated in 1986. The competency based curriculum was designed and developed and instructional materials were prepared during 1987 to 1990. The new curriculum was introduced in primary school in phases from 1992 (BNCTB, 1988). The prevalent curriculum in grades 1 and 2 include Mother Tongue Bengali, Mathematics, Environmental Studies, Religions Education and Arts and Crafts. Along with these subjects English, Social Studies and Science are compulsory subjects in grades 3 to 5.

7.3 Education System of West Bengal of India

Indian educational system is vast, in terms of numbers of institutions, students, and teachers as well as in the variety of educational activity. The central government's responsibility is mainly for the maintenance and coordination of standards of higher and technical education. The Constitution directs the State to provide free and compulsory education for all children up to 14 years of age.

The formal education in India begins with 5-years primary education which is followed by 3-year middle, 2-year of secondary and 2-year of higher secondary education. Primary schools are, by and large, co-educational. Higher education is provided in universities and colleges. Technical and professional courses range from three to five years for a first-degree course to two to three years for post degree course.

The curriculum framework prepared at the central level provides a broad overview of the school curriculum, including general objectives, subject-wise objectives, suggested scheme of studies, and guidelines for the transaction of the curriculum and the evaluation of pupil outcomes. However, the states consider whether to adopt or adapt the NCERT syllabi and instructional materials. Thus, the

NCERT curriculum framework is always a suggestion rather than prescriptive and it is not enforceable by law in the states.

All over India, schools which are affiliated to Central Board of Education, the Elementary education is up to grade-VIII while secondary education is from grade-IX to grade-XII. As per the recommendation of the Education Commission (1964-166), State Government restructured the educational pattern of 10 + 2 + 3 system. As far as the schools affiliated to the State Boards of Education are concerned, the policy of deciding number of years for study at primary level. It differs from state to state. In Gujarat, the primary education is up to grade-VII, while grade-VIII to grade X is considered to be the time span for secondary education whereas in West Bengal, the elementary education consists of 5 years of schooling from grades I-V followed by Jr. High or Upper Primary Education from grade VI-VIII provided in all Jr. High, Secondary and Higher Secondary schools. A child enters into the system at the age of 5+ and takes part in the first public examination at the age of 15+ after completion of 10 years of general school education and leaves after completing Higher Secondary stage at the age of 17+ (Government of West Bengal, 1999).

The subjects to be studied in this area are language (mother tongue), Arithmetic and environmental studies in the form of studying Natural Science, History and Geography. In primary education, the medium of instruction is mother tongue and one-single language (mother tongue) has been prescribed for study.

7.4 Rationale of the Study

The primary education is the foundation of any education system. Mathematics is one of the courses of basic education which is delivered mainly through primary education. Primary mathematics curriculum should therefore be developed keeping in view, the needs of the learners and their society. Quality of mathematics education always depends on the curriculum and its implication in any country.

The aim of mathematics education cannot be confined only to the knowledge and skill necessary for everyday life. Knowledge and skill of mathematics are pre-requisites for learning other important subjects (Sho, 1997). Developing logical thinking with interesting mathematical activities should be also one of the aims of

primary mathematics education. By summing up these, one can say that aim of mathematics education at primary level could be

(i) imparting knowledge and skills,

(ii) developing logical and rational thinking,

(iii) application of mathematical knowledge in day-to-day life.

The extent to which these aims are imparted through curriculum in any country is a major question! The detailed study of mathematics curriculum at primary level in any country would answer this question. Comparison of mathematics curriculum at primary level will enable the researcher to study the extent to which above aims are included in the primary mathematics curriculum in Bangladesh and West Bengal of India and transmitted in schools at primary level. The related literature throws light on gaps existing in primary education and poor qualities of curriculum and its implication in Bangladesh. Standard of education depends on the standard and effort of the teachers and teachers' performance depend on standard curriculum (Roy, 1986).

Bangladesh, like other nations, felt the need to modify the existing education system to improve the quality of education. With this felt need, different Educational Commissions and Committees were formed. Finally, competency based curriculum was introduced from 1992 (BNCTB, 1988) starting from grade I-V. Curriculum renewal and development is an ongoing process and no nation can afford to neglect this matter. The curriculum must meet the learner's needs, societal expectations, community aspirations and international comparisons. Bangladesh Education Commission's report (1974) suggested for continuous evaluation and research in the field of curriculum materials.

The Government of Bangladesh brought about a reform in the curriculum and syllabus of primary education through the BNCTB which has already been put into practice. But no systematic attempt has so far been made to bring qualitative improvement in primary education through curriculum research, specifically in the area of primary mathematics curriculum. Hossain and Jahan (2000) pointed out some of the major deficiencies in curriculum development in Bangladesh which include:

(a) lack of professional expertise in the development of modern curriculum, both in the BNCTB and nationally;

(b) lack of a solid research base providing assessment information about the previous curriculum and the areas needing revision; and

(c) insufficient curriculum emphasis on such competencies as understanding, comprehension and application.

In the absence of any empirical study on primary school curriculum in Bangladesh, it has not yet been possible to evaluate the effectiveness of the existing mathematics curriculum as prescribed by the BNCTB. Even the facilities for implementing the mathematics curriculum in the primary schools of Bangladesh are not known due to lack of systematic research. Whereas various research studies in India have been conducted and reported that learning achievement of primary school children in general and mathematics in particular is far from satisfactory (Das, 2000).In the age of science and technology, a strong base of mathematics is absolutely necessary for all. Therefore, how to develop the basic mathematical competencies among young children is a strong need felt by teachers, researchers and educators.

Periodical revision and reform of curriculum and syllabus must be carried out to make it need centred for the children of the country, to achieve the national goals and for the contemporary world, and at the same time all possible measures have also to be taken for its proper implementation. Implementation of curriculum at the primary schools in Bangladesh and West Bengal of India and its study is of vital importance in determining the effectiveness of the mathematics curriculum and the quality of primary education in these countries.

Documents of national policy of education and review of related literature tell that Bangladesh needs to improve the quality of education by modifying the curricula at all levels. For the sake of improvement in quality of Education, Bangladesh cannot adopt ready-made ideal curriculum and education system from any other developed country because the differences of cultural and social aspects of both these countries would lead to failure of the system due to blind imitation. If at all Bangladesh wants to follow or borrow something good as a sample of education system for the sake of better quality of education, she must look into similarities of the culture, language and other aspects of that system from which educational ideas could be borrowed for the better quality of education.

By exchanging information and experience, pooling expertise, sharing facilities, and undertaking joint activities, several countries, working together, can increase their resource base and lower costs to their mutual benefit. Such arrangements are often set up among neighboring countries (sub-regional), among all countries in a major geo-cultural region, or among countries sharing a common

language on having cultural and commercial relations. Regional and International organizations often play an important role in facilitating such co-operation between countries (WCEFA, 1990). However, of late there has been more attention to mathematics programmes which are based upon the needs and cultures of the ethnic mixes found in most countries. First looking at UNESCO, most of UNESCO's work is directly with the governments of its Member States, and the mathematics education programme is no exception. Upon request, the mathematics education specialist from UNESCO works with the ministry of education, advising and providing information. UNESCO's principal emphasis on mathematics education has been to promote the exchange of information, to work nationally, and to co-operate with regional and international groups (Jacobsen, 1996).This, in turn, will help the system to lift up the quality of education.

Now looking to the fact that the sharing of Bangla, by Bangladesh with parts of the India – offer both possibilities and challenges for cooperation among people in education and culture – in literacy field as well as in substantive study of science, social science and humanities. Bangladesh is known to use Bangla in its judicial and perhaps educational system to a much greater extent that in Indian West Bengal – and the latter is said to be studying the former (Bhattacharya, et.al., 1993). The Dhaka declaration (December 1985), as it came to be called, underscored the historic significance of the first ever summit meeting of the South Asian Countries and described it as a tangible manifestation of their determination to cooperate regionally, to work together towards finding solutions to their common problems in a spirit of friendship, trust and mutual understanding and to the creation of an order based on mutual respect, equity and shared benefits (Bhattacharya, 1995). Bangladesh and West Bengal of India, is not only a distinct entity in geo-political terms but also shares common historical, cultural, religious and linguistic heritage. Not only that India and Bangladesh have many agreements to their credit to foster all round ties between the two countries but they also share democratic relations and are sharing many common policies in world affairs.

In this context, it is of great importance to study and compare mathematics curriculum at primary level of both the countries. This, in turn, will help the researcher to spell out the positive strong points of curricula of both the countries. Such research work will help to give answers to questions raised regarding the achievement of goals of primary mathematics education in context of the present

needs of the society, existing gaps of the education system of Bangladesh and West Bengal of India in terms of curriculum design and its implementation and suggestions to modify the primary mathematics curricula if needed for better quality of education and to satisfy aims of the primary education. Such comparative study will help to identify strong positive and negative points existing in curricula of both the countries that will further enable to give suggestions for modification of primary mathematics curricula of Bangladesh and West Bengal of India.

Therefore, a comparative study of the primary mathematics curriculum in Bangladesh and West Bengal of India would be of great value, because on the basis of such a study, an insight will be developed into existing scenario and issues related to mathematics curriculum which in turn would guide for appropriate plan of action which may be undertaken for the implementation of a good quality primary mathematics education.

7.5 Statement of the Problem

"A Comparative Study of Mathematics Curriculum at Primary Level in Bangladesh and India (West Bengal)".

7.6 Objectives of the Study

The objectives of the study are to

(1) Critically examine the mathematics curriculum for primary education in Bangladesh and West Bengal of India.

(2) Identify the teaching process of primary mathematics that take place in classes of Bangladesh and West Bengal of India.

(3) Identify the problems and obstacles in transacting primary mathematics curriculum in classroom situation in Bangladesh and West Bengal of India.

(4) Identify the major strengths and weaknesses of the primary mathematics curricula of Bangladesh and West Bengal of India.

(5) Compare the primary mathematics curriculum of Bangladesh with that of West Bengal of India with respect to

   a. teaching processes in classes.
   b. problems and obstacles in transaction of curriculum in classroom
   c. strengths and weakness of the curriculum.

(6) Provide specific suggestions for revision and modification of primary mathematics curriculum of Bangladesh and West Bengal of India.

7.7 Explanation of the Terms

Curriculum: curriculum refers to objectives and contents prescribed by the Bangladesh National Curriculum and Textbook Board and West Bengal Board of Primary Education and teaching-learning processes in classroom situation and/or outside classroom transacted by the teachers in the schools of Bangladesh and West Bengal.

Primary Level: For this study, grade I-V of Bangladesh and West Bengal are considered as primary level.

7.8 Plan and Procedure of the Study

In order to realize the stated objectives, a survey was planned to collect the data from different sources of the primary schools of Bangladesh and west Bengal of India. Two types of data were collected - qualitative and quantitative to attain the objectives of the study; with the help of following tools.

Tools

The investigator developed the tools, such as two questionnaires, one for the primary school mathematics teachers, the other for the academic supervisors, one opinionnaire for the experts (curriculum and subject specialists), and an observation schedule. All these constructed tools were given to group experts of both the countries to judge the adequacy and appropriateness of items of the tools in the context of the study. As per comments of the experts the tools were further modified to conduct the pilot study.

These modified tools were given to the respondents of parallel categories of Bangladesh and West Bengal of India to confirm whether the items of the tools are understood properly by the respondents or not.

As per responses, the researcher had checked the language ambiguity and finalized the items of the tools.

Data Collection

The data mainly collected through (i) documents (ii) observations in real classroom situations and (iii) responses obtained through questionnaire and opionionnaire given to the mathematics teachers, academic supervisors, and experts (curriculum and subject specialists) from both the countries.

For achieving objective one, documents / reports and textbooks were referred. For achieving objectives 2 to 4, 240 mathematics teachers (120 from each country), 120 academic supervisors (60 from each country), 12 curriculum specialists (6 from each country), 8 subject specialists (4 from each country) and classroom observations (24 primary schools, 12 from each country) were considered as the sample.

7.9 Data Analysis

The data collected were classified and tabulated. The following two techniques of analysis have been used in order to arrive at the findings of the study.

Quantitative Analysis

The data collected through questionnaire, opinionnaire, and observation schedule were analyzed as follows:

There were two types of items in the tools, viz., closed-ended type (such as multiple choices, yes/no) and open-ended type. The responses to each item of closed-ended type were analyzed in terms of number (frequency) of responses. The frequencies were further converted into percentages to describe the results of the item to arrive at the findings. The data supplied by the respondents to each of the open-ended items were categorized on the basis of their contents into different clusters along with their frequencies and percentage.

In case of examining the suitability/appropriateness of the curriculum, particularly objectives, competencies, contents and consistency among these aspects, the respondents were asked to put tick mark (√) against relevant categories of responses viz., 'To a Great Extent (TGE)', 'To Some Extent (TSE)', 'To a Little Extent (TLE)', 'Not AT All (NAA)' and 'Different Opinion' given against each item. The last choice 'different opinion' was not responded by any of the experts. **Hence, the scale was reduced from five to four points with choices namely, TGE, TSE,**

TLE and NAA. Thus 4-point scale was utilized for further statistical analysis by assigning numerical values to each alternative response choice as shown below:

Choices	Abbreviations	Scale Values
To a Great extent	TGE	3
To Some Extent	TSE	2
To a Little Extent	TLE	1
Not AT All	NAA	0

The sum of the products of scale value and corresponding number of responses was considered as the total score of the individual item. The mean value of each item was computed by dividing the total score of the item by the total number of responses.

$$\text{Mean Score of an item} = \frac{3\times N_1+2\times N_2+1\times N_3+0\times N_4}{N}$$

Where N is the total number of respondents; N_1, N_2, N_3, N_4 stand for number of responses for the choices; To a Great Extent, To Some Extent, To a Little Extent and Not at All respectively.

By this calculation procedure, the mean score of any individual item ranged between 0 and 3. Keeping in mind the continuum of scale values from 0 to 3, the mean values would be interpreted as follows for different intervals.

Interval	Interpretation
[2.5, 3]	TGE
[1.5, 2.5)	TSE
[0.5, 1.5)	TLE
[0, 0.5)	NAA

Qualitative Analysis

Technique of critical analysis in context of curriculum objectives and its comparison with standard set of objectives (RCDICMDCA) have been utilized. Using the same technique, the investigator investigated aims and objectives stated in the curriculum and grade-wise content-areas of primary mathematics based on the

documents and textbooks in both the counties for the realization of objective one of the present study.

7.10 Major Findings

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

7.10.1 Major Findings based on the Analysis of Mathematics Curriculum

7.10.2 Major Findings based on the Analysis and Interpretation of Data.

The subsection 7.10.2 is further divided into four parts namely A, B, C and D.

7.10.1 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)

7.10.2 Major Findings based on the Analysis an. 'nterpretation of Data.

Here, the major findings are presented in t 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 (ke.. :ction 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 section 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 section 5.3). The fourth column 'D' is based on the major findings arrived at through the analysis and interpretation of classroom observations (Refer section 5.4).

Table-7.1: M.jor Findings based on the Analysis and Interpretation of Data

(A) Findings based on Questionnaire given to Mathema s Tea ers	[B] Findings based on Questionnaire given to Academic Supervisors	[C] Finding based on Opinionnaire given to Experts	[D] Findings based on Classroom Observations.
(1) On the basis of the academic result (class/divisio.), it was found th West Be .al mathema.ics teachers' scholastic achievem.nt is higher than that of Bangladesh teachers. (2) 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 (3) More barriers are found in Bangladesh comp.ared 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' (4) Teachers training facilities are more in West Bengal compared to Bangladesh. (5) Teachers of Bangladesh desire to e: end	(1) According to academic supervisors of Bangladesh, highly populated cl. sroom:, inattentive pupils, teacher not encouraging pupils and teaching from 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 . (2) It was found that 'inappropriate seating arrangement' and 'lack of pupil-tea her rapport' are major (common) problems in Bangladesh than that of W.st Bengal during the teaching of mathematics. (3) Teachers and pupils related problems were found more in Bangladesh classrooms than tha' of west Bengal There are similar type of problem. in classrooms of both countries like insufficient use of teaching aids, lack of mastery	(1) According to Bangladesh experts objectives in general for , mary 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 (2) According to Bangladesh experts content incorporated for developing mathematical knowledge, thinking (specifically for content: concept of number, FFO- 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	(1) On an average in West Bengal mathematic: teachers get mo. time for teaching 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 (2) Majority of mathematics teachers (96.0%) 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. (3) It was found that all teachers and pupils from both countries use mathematics textbook during teaching-learning process in the classroom.

professional training on teaching mathematics more than that of West Bengal in absence of training.

(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.

(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 difficulty 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

(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.

(9) The most commonly used teaching method is the problem-solving method used by almost all teachers of both countries followed by the

in conceptual understanding of mathematics subject by the teachers, irregular attendance of learners and inappropriate teacher-pupil ratio.

In addition to these common problems of both the countries, in Bangladesh, problems were found in mathematics classes like 'shortage 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.

(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.

(5) Most of Academic Supervisors from Bangladesh (85%) and West Bengal (72%) opined that teaching aids are used by teachers to some extent for teaching of mathematics.

(6) It was found that qualities of mathematics teaching-learning in the school of West Bengal are better than that of Bangladesh.

(7) It was found that West Bengal teachers arranged mathematical activities more compared

extent.

(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 competencies (class-wise) for developing awareness (among children to solve their day to day problems) are suitable to some extent.

(4) According to experts of both countries, it was found that 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.

(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

(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 (87%) introduced the lesson based on the previous knowledge of the pupils and the relevant activities.

(5) 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.

(6) It was found that pupils' participation to the great extent was observed 5% in Bangladesh and 44 8% in West Bengal.

(7) 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%).

(8) Most of the mathematics teachers in the schools of Bangladesh and West Bengal of India used clear understandable language

question-answer. In this regard, West Bengal teachers used 'roble solving' and 'question-answer' more than that of Ba.. idesh teachers.

(10) Majority of teachers of bo.. countries opined that shortage of non human resources such as mathematical models, mathematical games and instructional materials were the major problems / obstacles in mathematics teaching.

(11) Majority (91%) teachers of Bangladesh and 71% teachers o. 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.

(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

(13) 75% teachers of Bangladesh and 79% teachers from West Bengal emphasised the need of illustrative examples in mathematics teaching (i) for explanation of some complex / abstract

to that of Bangladesh teachers for increasing mathematics comprehension among pupils.

(8) Academic supervisors of West Bengal organized in-service training on mathematics for teachers more than that of Bangladesh academic supervisor i e in-service training facilities are found more in West Bengal than that of Bangladesh.

(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

(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.

(11) In both the countries, it was found that the content areas of mathematics textbooks reflected the socio-cultural aspects of the respective country. The textbooks of both the countries differ in terms of representation of such socio-cultural aspect only in terms of organizations of such content at different levels at primary stages for grade I to V

West Bengal.

(6) Experts of Bangladesh (33% curriculum specialists and all subject specialists) highlighted the need of introducing illustrative examples for explaining mathematics content that reflect 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.

(7) According to curriculum specialists major strength of Bangladesh mathematics curriculum lies in its unified curriculum throughout the country which maintain horizontal (with other subjects) and vertical (within itself) co-ordination of well-graded content related to pupils, and life-oriented situations.

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

through specific words with and without illustrations, and their audibility remained clear through out their teaching in the classroom.

(9) All the mathematics teachers in the schools of Bangladesh and West Bengal used 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'.

(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.

(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 workout in the classroom; while teaching mathematics topics.

content in which only verbal explanatio is not enough. (ii) fo 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 c eative thinking of the pupils; and West Bengal teachers felt need for making problem solving easier and simpler.

(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'

(15) According to 25% teachers from Bangladesh, the strengths of mathematics curriculum and its transaction are due to the class wise attainable

(2) 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.

(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.

(14) It was found that common strengths of mathematics curriculum for both the countries are skills development in mathematics, suitable ontent-areas distributed grade-wise and arranged from concrete to abstract, appropriate evaluation procedure.

In addition to these common strengths, it is found that, content integration with socio-cultural aspect; pictorial presentation of content, emphasize 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.

In addition to the common strengths, major strengths of mathematics curriculum of west Bengal are introductory discussion, inclusion of revision chapter related to previous grade's textbook, up-to-date textbooks, exercise

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.

According to subject specialists of West Bengal major strengths of curriculum are due to well-developed numerical concepts (integers, fractions, decimals representation) leading to better understanding of pupils, FFOs and their use to solve various problem of everyday life, units for measuring objects used in everyday life and its relation, concepts of money, length, weight, area, square, measurement and time, development of basic geometrical concepts through figures, mean, 'LCM & HCF', counting, percentage, graph, measurement of land with illustrations to make mathematics subject life-centred, child-centred and environment-centred.

(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.

Subject specialists from Bangladesh opined that lack of content articulation from grade-II to III and no scope for developing skills

(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.

(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.

(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 (58.4%). 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

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.

(16) According to 25% teachers from Bangladesh, the weaknesses of mathematics curriculum and its transaction are due to complex and complicated 'word problems' related to the 'four fundamental operations' and 'fractions'; deficiency of charts for 'decimal 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 at the end-of-chapter and word problems involving four fundamental operations from numeric to statement and vis-à-vis.

From the list, it is found that the list of strengths of West Bengal curriculum is larger than that of Bangladesh i.e. West Bengal mathematics curriculum is stronger than that of Bangladesh.

(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.

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.

From the list it is found that Bangladesh mathematics curriculum is weaker than West

of translating verbal statements into mathematical form and vice versa are the major weaknesses of mathematics curriculum

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.

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.

(9) Curriculum specialists from Bangladesh suggested that teacher training needs to be strengthen and mathematics teacher should be trained on teaching-learning strategy.

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.

used by the teachers of West Bengal was the problem-solving method (68.4%).

'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 vise-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. 17. Teachers of Bangladesh have given more suggestions in context of training compared to that of West Bengal teachers. 18. 53% of teachers from Bangladesh gave suggestions in context of recruitment of mathematics teachers who have studied mathematics.	Bengal curriculum. (16) Academic supervisors of Bangladesh have given more suggestions in context of training and recruitment compared to that of West Bengal academic supervisors		

7.11 Conclusion

On the basis of the discussion (given in chapter-VI); 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

7.12 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.

7.13 Implication of the Study

This study attempted a comparison between mathematics curriculum (at primary level) of Bangladesh and West Bengal of India; to critically analyze and examine both the curricula that would be helpful to understand the strength and weaknesses of these curricula which in turn would be helpful to curriculum experts to understand the phenomenon of the transaction of the curriculum in corresponding country. Based on these understanding of the transaction of the curriculum and the various aspects affecting the effectiveness in the processes of transaction, the curriculum experts (of both the countries) would be enabled to incorporate those aspects (such as objectives, content activities) which would help them to further

modify the primary level mathematics curriculum to provide good quality education at this level. Further; the suggestions made above, based on the indepth study of the researcher are also helpful to the academic supervisors of both the countries to monitor the effective transaction of the curriculum.

Also the study is very helpful to the policy makers for appropriate revision and modification of existing curriculum and policy making of the recruitment of teachers for better quality of mathematics education at primary level. Last but not the least; the study is helpful to all those teaching community and having research aptitude for their further research and implication of the results of this study.