CHAPTER 9

DISCUSSION AND CONCLUSION

9.1 SUMMARY OF OVERALL FINDINGS

The purpose of this chapter is to re-examine the issues which have been raised in earlier chapters and discuss the findings which relate to factors affecting mathematics education at school level with special reference to undivided Bongaigaon district. The introduction to the thesis gave an overview of mathematics and mathematics education. The need and significance of the study was underlined by educators’ concerns on focusing on the students having a real knowledge of basic concepts as opposed to merely obtaining high marks in examinations.

The purpose of this research study as stated in chapter I was to make a comparative study of the students’ mathematics achievement in examinations, knowledge of basic concepts from syllabus and aptitude for mathematics and to ascertain whether there is a relation among them. Also the study sought to ascertain whether school environment, socio-economic conditions and students’ and teachers’ attitude towards mathematics were factors affecting mathematics achievement. Comparisons of results with respect to government and private schools, rural and urban areas, boys and girls were also looked into as a part of the research.

Chapter 2 presented the literature review. The published articles by accredited scholars and researchers established the knowledge and ideas relevant to mathematics education research. This provided a guiding concept and a justification to the present study. Mathematics education research is a vast area. This study focused on Attainment
of concepts in mathematics, Socio-economic factors affecting mathematics achievement, School factors affecting mathematics achievement Attitudes towards mathematics, Gender and Mathematics and Mathematics Textbooks.

In Chapter 3, the study established a relationship between mathematics achievement in examinations in relation to the knowledge of basic concepts and an inherent mathematical ability of the student. It was found that the average conceptual knowledge and mathematics ability of the students were lower than their scholastic achievement in examinations. All three were positively correlated. Taking (1) conceptual understanding and (2) mathematics ability as predictors of scholastic achievements it was shown that an increase in the value of each of these predictors will show an increase in the scholastic achievement of the students. The goals of mathematics education should be to develop both procedural knowledge and conceptual knowledge and there should not be any conflict in the minds of the student regarding the two. In course of the extensive field work conducted during the studies it was seen that the teaching process in mathematics classrooms follow a traditional approach. As was observed, teachers actively explain the material, provide examples and exercises while students listen, write and perform tasks initiated by the teachers. Classrooms discussions and interactions were missing except in a few private institutions. It was noticed that the students were learning the steps and methods for working out the solutions to the problems instead of making sense of the concept behind the problem. They were unable to use prior knowledge and adapt it to the problem at hand. A large number of careers require knowledge of mathematics. Students should be able to apply the mathematics they have learned in classrooms to real life situations. It is this level of comprehension that teachers should aim for in order to improve the quality of mathematics education.
The socio-economic factors which affect mathematics education of school students were discussed in chapter 4. The socio-economic variables that were included in the present research include family income, parental education and parental occupation. Family income was found to be a powerful predictor of student performance. There is a strong positive correlation (.750 for class IX and .730 for class VII, correlation being significant at .01 level) between family income and combined scores of the students who were tested. Higher incomes indicated higher mathematics scores of the school students who were a part of this research.

Significant differences in the means of the combined scores of students were seen for different parental educational levels. It is seen that high scorers are positively related to higher levels of education both in case of fathers and mothers. This can be attributed to the help the students got in home from the active participation of their parents. On the other hand parents with low level of education were not able to provide help on school work but also uneducated parents were seen to be indifferent to their child’s learning and did not have aspirations of well paid jobs following higher studies of their children. Parental occupation did not play a role in the mean scores of the students who were a part of this research.

In Chapter 5 associations between the school environment and the mathematics achievement of the students were studied. The variables included were school management, school area, physical facilities like infrastructure, availability of text books, teacher-student ratio, teaching methods used, daily homework and specific training for teachers.

It was found that school management did affect the combined score of the students for the sample under investigation. Students from private schools did better than their government school counterparts. In case of Private schools it was seen that
there was an active Parent Teacher Association and concerned guardians visited the schools on a regular basis, thus being constantly updated on the progress of their children. However among the Government schools surveyed, the school authorities reported that they did not get support from parents and guardians. A vital aspect of the education triangle, that is parental involvement was missing.

It was also seen that students from urban areas scored higher than those in rural areas. While educational policies of the government have caused an increase in the number of children attending schools, yet our research findings indicate that the majority of the children could not solve basic mathematic problems.

Analysis of data indicated causal linkage between infrastructural facilities like condition of school buildings, inadequate classrooms that resulted in large groups being assigned to a classroom, inadequate furniture and student outcomes. Significant differences in the means of the combined scores for schools with and without infrastructural problems were found.

Availability of textbooks was a significant factor in student achievement. The group where the prescribed mathematics textbook was readily available in the beginning of the session showed higher achievement.

Teacher-student ratio was seen to have an impact on student achievement. In rural areas where there is an insufficient number of teachers the teacher-student ratio was seen to be high. Lower teacher-student ratios resulted in higher achievement.

Variations in means were seen among the sample population who were given daily homework and those who were not. Mathematics achievement favoured the group that was assigned daily home work.
The common teaching method observed during the field work was lecture and use of blackboard. Few schools especially private schools adopted other measures. An important factor was the existence of a mathematics laboratory. There were significant differences in the means of the combined scores for the groups exposed to different teaching methods.

A mixed effect was demonstrated in the case of specific teacher training. The group which had to rely on traditional methods only showed a lower level of achievement. Analysis of data yielded no significant differences between the two groups in class IX. However in case of class VII the result indicated significant variations in the means of the two groups.

The issue of the relationships between students’ mathematics achievement and the attitudes of both the student and the teacher toward mathematics was examined in Chapter 6. Both student and teacher attitudes towards mathematics were found to be factors of student learning. There were seen significant differences in the means of the mathematics achievement scores of the students for different attitude levels both in case of students and teachers. There is a high positive correlation between attitudes of students and their scores in mathematics and a moderate positive correlation between attitudes of teachers and the scores of their students in mathematics. This suggests that more positive attitude creates the opportunity for learning and motivation that leads to success in mathematics performance.

Chapter 7 explored the influences that gender played on the mathematics achievement of the student. There was no significant difference in the means scores of boys and girls. It was seen that the gender of the student did not affect the combined score of the students for the sample under investigation. Though previous research has revealed the existence of gender disparities in mathematics education, it is also a fact
that these gender gaps are being diminished over time. Research that further explores the connections between gender and mathematics achievement is needed.

Chapter 8 was a comparative analysis of the mathematics textbook used in the different schools surveyed as a part of the research. The study sought to compare the two textbooks with respect to comprehensiveness of topics covered and similarities and differences in approach to the geometry portion. In the SCERT mathematics textbooks it is seen that emphasis is based on activity based learning. The NCERT textbooks have considerable number of solved examples and practice exercises which makes it possible for average students to work on their own. Overall concepts were introduced at a later stage in SCERT books in comparison to NCERT books.

9.2 EDUCATIONAL IMPLICATION

Analysing the resources and the factors of education is very essential as it allows for the determination of progress in the field in the years to come. The findings of this study could be of great help to all those associated with educational reforms which include parents, teachers, educationists, psychologists and the government. It is hoped that the work performed in the thesis is of benefit to existing materials and ideas in the research of theory of mathematics education. It may be a base for exploration of further issues related to mathematics education.

Research in school mathematics is given a top priority in developed countries. In India this is also a widely studied area. However in the North –east this area of research remains a neglected area.

School mathematics is the foundation for success in a child’s educational experience. In today’s technology driven society, greater demands have been placed on mathematics learning and its adaptation to real life situations. Hence the
importance of mathematics cannot be undermined. The present research studies various interrelated factors that affect the teaching and learning of school mathematics.

Findings confirm the correlation that exists between scholastic achievement in examination, conceptual knowledge of the subject and mathematics ability. The findings also provide evidence about the extent of differences between conceptual understanding and the marks obtained in examinations. Among the students of this study it is seen that pupils with high scholastic achievement were able to respond with success to examination questions but were not able to solve conceptual questions with accuracy and understanding.

In general school mathematics was seen to consist of achievement of certain techniques with examples to be mastered and exercises to be carried out. Emphasis should be placed on teaching students to develop a conceptual understanding of mathematics which would help them to relate school mathematics with the mathematics applied in real life. This requires restructuring the examination process accordingly. The examination system should be such that the question pattern should not be such that high marks can be obtained only through a high degree of computational skill. Rather there may be a 60% - 40% divisions in the pattern of questions. The first part consisting of known type questions while the second part contains questions that require students having a clear understanding of the various steps involved in solving the problem. This approach thus would complement a system of mathematics education that encourages competency to average students and encourages excellence to exceptional students.

Another implication is that the method of teaching has to be made more effective. An annual teacher training programme which is imparted by a certified
group of academic cadre of trainers of high quality and competence, who regularly professionally update themselves, is a crucial need. Curriculum reforms have resulted in teachers having to teach topics which they did not themselves study. Thus there is need for professional development of teachers. Also, in course of such programmes teachers should feel highly motivated to teach. Whatever be the external circumstances a high level of personal motivation affects the learning of the student as has been seen in this present study. Laboratory method of teaching mathematics should also be used in school. In keeping with the result of this study is the report that Teachers’ training institutes lie idle in the state. It is reported that in spite of more than 5000 seats in training institutes under the SCERT, only 80 teachers have undergone training in the current year. (The Sentinel, April 2010). The State Government has now made teachers’ training mandatory at the school level. The Right to Education Act stipulates that training of teachers is a must for quality education. (The Telegraph Northeast, August 2010)

The present study also demonstrates the effect of school environment on mathematics education. The findings in this research paper also highlight the differences in all three variables among government and private schools. The condition of government schools in India needs to be improved This is in keeping with the reports published in newspapers which state that there are hardly any teachers to teach the children in the government schools in the state. According to a report published in the Sentinel there is a huge shortfall of teachers and there have been no appointment of teachers since 1999-2000. (The Sentinel, April 2010). The education department has about 12,000 vacancies of teachers from lower primary to higher secondary school level and due to this students are suffering badly. (The Sentinel, October 2009). Most government upper primary and secondary schools in
Assam are without any library, laboratory and proper monitoring facilities. Of the 2060 government secondary schools in Assam, 43% have electricity facility, 66% have library facility, only 1.6% have science laboratories and a bare 2.3% have internet facility (The sentinel, November 2009). The education sector is of vital importance to the government. Thus imparting quality education uniformly in all schools is the need of the hour.

It has also been shown that there are no gender disparities in the area of mathematics education in the field of the current research. This is an encouraging sign.

9.3 LIMITATIONS OF THE STUDY

The study has limited its discussion on Secondary school students in undivided Bongaigaon district. There is need to include a larger number of samples which are extended to wider areas in order to generalize the findings of the study.

Also the study is conducted at the secondary level. This can be extended to other grade levels.

The cross section method was applied in the present study, for a more in-depth study the longitudinal method may be applied.

9.4 SUGGESTIONS FOR FURTHER RESEARCH

The research studied various factors which affect mathematics education. There are many other factors which can also be studied.

A similar research may be conducted on primary school children taking the same variables.
Teachers as an important component of mathematics education need to be studied further.

Studies may be conducted on special groups like gifted children, physically handicapped and first generation learners

Sources of difficulties in multi-step problems with particular reference to learning geometry is another area for research

Ethno mathematics which studies the relationship between mathematics and culture is a study area which maybe researched with particular relation to the North-East India.

Another area of research can be linkage between mother tongue of the student and medium of imparting mathematics education and related achievement in mathematics.

9.5 CONCLUSION:

India has notified education as a fundamental right for all children between six to fourteen years enabling them to legally demand education from the government by means of the Right of Children to Free and Compulsory Education Act ,2009. In such circumstances the importance of providing quality education at school level in all subjects cannot be undermined. To the education that that school children receive it has to be stressed that a quality mathematics education must be an integral part of their learning experience. Thus research in mathematics education remains a continuing and vital need in the educational scenario