CHAPTER 8

MOTIVATION AND SCOPE OF FUTURE RESEARCH WORK

8.01 INTRODUCTION

In this short chapter, we wish to concentrate on some motivations of the results described in this monograph. These motivations give rise to many interesting research problems in the field of our study. As we know, though the growth of the general theory on mathematics education seems to be old, the real breakthrough for the development of these areas has come with profound work of many outstanding mathematicians in the field. At present, this field is not only confined in a small area in mathematical sciences with an independent life, but also serve as a unifying thread interlacing many other branches of mathematics and science, and thus, it suggests a very wide scope of doing research.

The importance of mathematics has never been greater than now and for the foreseeable future. Mathematical skills are crucial for a wide array of analytical, technological, scientific, security and economic applications. Training students to become adept users of mathematics and to appreciate its usefulness is of paramount importance for the future. If we love doing mathematics and helping others to understand
how mathematics can be useful and important to them, mathematics education may be our calling.

Mathematics teaching is an area of national need so the demand for mathematics educators is very high. Every school should have an excellent program which will train students in the latest developments on the teaching and learning of mathematics, including how technology can profoundly impact those ideas. Learning to communicate clearly about mathematics with learners will be a fundamental component of the training as students will be spending time in school classrooms working with teachers during the training. With a mathematics teaching certificate from a school, students credentials will put them in a great position to compete for the crucial work of training our next generations in an ever-changing society.

The Ph.D. program in mathematics education prepares supervisors, teacher education personnel, community college personnel, and researchers in mathematics education. Over the last few years issues connected with learning and teaching mathematics have become a matter of the highest importance for everyone involved in education, training and publishing. It has been taken up at the highest policy level. Mathematical competence has been identified by the Education Commission as one of the key competences necessary for personal fulfillment, active citizenship, social inclusion and employability in Modern society.

It is a Global Problem: Improving Students’ Achievement in Mathematics. The major reasons for such a huge interest in learning and teaching mathematics are growing needs for mathematical skills and
proficiency in modern society and at the same time difficulties in learning mathematics and a large number of low achieving students. The problems connected with learning mathematics are common in many societies.

According to Statistical findings, the proportion of low achieving students in mathematics to the total number of students is an important factor of mathematics education quality. Students described as low achievers have such a limited mathematical knowledge that it can only be applied to a few familiar situations. The weakest students are unable to demonstrate mathematical literacy in situations required by the scientific tasks, which may impede their functioning in society and economic environment. As Figure 1 shows, in the 27 European countries in 2009, an average 22.2 % of students were low achievers in mathematics.

![Graph showing percentage of low achieving 15-year-old students in mathematics in 27 European countries, 2009.](image)

Fig. 8.1 Percentage of low achieving 15-year-old students in mathematics in 27 European countries, 2009.
Slow faculty uptake of research-based, student-centered teaching and learning approaches limits the advancement of school mathematics education. The study suggests the real-world promise of broad uptake of student-centered teaching methods that improve learning outcomes and, ultimately, student retention in school mathematics.

This study of early-career teachers identified a significant relationship between upper-elementary teachers’ mathematical content knowledge and their students’ mathematics achievement, after controlling for student- and teacher-level characteristics. Findings provide evidence of the relevance of teacher knowledge and perceptions for teacher preparation and professional development programs.

We examined geometric calculation with number tasks used within a unit of geometry instruction in a school classroom, identifying the source of each task used in classroom instruction and analyzing the cognitive complexity of each task with respect to 2 distinct features: diagram complexity and problem-solving complexity. Implications of task analysis on geometry domain and textbook analysis studies are discussed.

Encouraging students to develop multiple solutions for given problems is an important way to improve mathematical knowledge. However, the influence of this teaching element on students’ interest-related motivational orientations is an open question. Some problems may be carried out to investigate the influence of prompting students to construct multiple solutions
for real-world problems with vague conditions on students’ interest in mathematics as well as on their experiences of competence and autonomy and the number of solutions developed.

Although there appear to be some studies in the literature of mathematics education that support the ideas of cognitive-based teaching and learning of mathematics, in fact these studies are seriously flawed in their methodology, or else lacking in proved conclusions, so that in the final analysis there are not any studies that demonstrate the effectiveness of such instruction.

“It is currently well acknowledged that the recent NCERT recommendations for reform in mathematics education emphasize a need to change the way mathematics is taught and learned ..”

A few lines later we read that “Current evidence from existing research projects that were instigated prior to, or coinciding with, the release of the reform documents indicate that students in reform-based classes do have significantly better achievement in mathematics than those in traditional instruction.” NCERT backed curriculum reform proposals have value in enhancing the mathematical achievement of students on a standardized achievement test and on instruments designed to assess students’ computational proficiency and conceptual development in arithmetic, their personal goals in mathematics, and their beliefs about reasons for success in mathematics.”

The results suggest that relationships between teaching and learning are a function of the instructional environment; different relationships emerged in the alternative classrooms than those that have been reported for more traditional classrooms.”
The whole Math word problems are especially challenging to students because they place demands on both reading and math skills. We are also worried that too few of our students are taking advanced science and math courses and are on track for science, technology, engineering, and mathematics (STEM) careers. It’s much too early to predict their career trajectories, says a new study in Science Education. The path to a chosen career is rarely linear.

8.02 SCOPE OF RESEARCH IN MATHEMATICS EDUCATION AND SOME OPEN PROBLEMS

There is enormous scope of research in mathematics education. One of the major objectives of research in mathematics education is to investigate the underlying factors associated to teaching, learning, understanding and evaluation of school mathematics. The following are some problems for future research:

1. Studies can be taken up to unearth the problems in learning mathematics of some special groups of pupils, such as

   (i) First generation learner
   (ii) Different socio- economic groups
   (iii) Mentally retarded pupils
   (iv) Physically handicapped students

2. Research may be carried out on the role of teachers’ ability as a motivating factor for pupils’ better understanding and for better performance in mathematics.
3. Study of effect of school environment, infrastructure facilities including teachers’ qualification, student-teacher ratio, provision for a good number of tutorial classes on the pupils’ performance in mathematics and on the overall success in the school’s final examination.

4. Explore the causes of students’ poor knowledge of some important arithmetical topics like decimal division, stock-discount, profit-loss, binary expansion of fractions etc.

5. Study on the relationship between attitude towards mathematics, mathematics anxiety and mathematics achievement.

6. Comparative study of effect of two teaching approaches, viz traditional black-board teaching and the electronic media like radio, films, video, TV & modern computer base techniques on achievement in mathematics will be of great value for the educational reformers.

7. Case studies may be undertaken to probe deeply into the factors for low achievement in mathematics of some special ethnic groups.

8. The curriculum – oriented research is a must in school mathematics with a special focus on effect of introducing new curriculum.


10. Correlation between social environment and students’ achievement in mathematics with special reference of the state of Assam.

11. Govt. education policies, Govt. administration and school administration in mathematics achievement.
Education policies are framed by Education department. Those organizations involved in framing and implementing policies may not be aware of the ground realities prevailing in different parts of a vast country like India. Even if they are aware to all such issues, those policies may not be suitable to all the sections equally and so those may not serve in the spirit in which those were adopted. Also due to social diversities same administrative measures of the schools may not work properly in all parts of the country. So case studies of different areas could help in proper management of the education system.