CHAPTER I

INTRODUCTION

1.1 TEACHING OF MATHEMATICS AT PRIMARY SCHOOL LEVEL

Education in general and primary education specific is playing a vital role in shaping the all-round development of the child. Primary education has an important role in various stages of school education. Primary Education lays the foundation stone for all stages of education. This is the basis for the progress of a nation. This is precisely the reason why primary education should be given top priority in the education ladder.

The progress and prosperity of a country largely depend on the development of education of the masses. The National Education commission (1959) viewed the primary education as an investment that could generate skilled manpower, which is essential for a development of a nation.

The primary education covers children in the age group 6-11 years studying in classes I-V. This is a very crucial stage in the physical, emotional, social, cognitive, and psychomotor development of the child.

Mathematics education imbibes the power of abstraction in the students. It is a subject of awareness of seriousness. The teaching of mathematics to young children is a complex task for a teacher at the beginning of his career. Mathematical structure is not a self-sustained element with any hinges or connection but is a full cohesive set of concurrent links, each of its stability being relative to the other and the whole. Each link is the mathematical structure internalized by the child is facilitated by the learning of some new concepts.

Garwood (1967) said that no ritual is more sacred in the ceremony than that which deals with the act of teaching. Hands and voices are raised in commending those who perform this holy act, while sack, cloth, and ashes are donned in demonstration of grief for those who have desecrated this most holy sanctuary of
human endeavour. The art of teaching is a valuable, legitimate and indeed indispensable subject of young graduate students who intended to enter the academic world.

On teaching of Mathematics, Piaget said, “Mathematical understanding is not a matter of ability in children. It is therefore erroneous to consider that lack of success in mathematics is due to a lack of ability. The mathematical operation derives from action, and it therefore follows that the intuitional presentation is not enough. The child itself must act, since the manual operation is necessarily a preparation for the mental one. In all mathematical fields, the qualitative must precede the numerical”.

Blaire’s (1981) Mathematics teaching as an art form – pupils are encouraged to develop their own ideas and discuss in a vocabulary such as one might employ in the critical analysis of an example of any art form the mathematics on which they have been working. According to Campbell (1956), teacher’s confidence in his/her ability to execute teacher behaviour to positively effect student outcomes or teacher efficacy, as it is known, is an essential aspect of teaching.

As Mathematics is a highly structured body of knowledge, there is an inherent difficulty for many of the children to keep up to date with the learning of the subject. So the task of a teacher to make mathematics learning effective is very big. He is required to deal with a distinctive body of knowledge, which is definite, logical and has a language of its own. In planning a lesson to teach in mathematics, the teacher is required to possess a knowledge of the nature of mathematics, and also a knowledge of psychology, because an interplay of these helps the teacher on major activities like teaching of concepts, facts, and principles, diagnosing student’s difficulties and providing effective remediation, evaluating both the progress of the student and of the teachers own effectiveness in teaching.

Teacher’s awareness of the teaching methodologies and techniques of testing are vital not only for an effective transaction of curriculum in the class room but also for improvement in the standards of achievement of children. The Delores’ International Commission on Education for the 21st Century stated in its Report,
“Improving the quality of education depends on first improving the recruitment, training, social status and conditions of work of teachers. They need the appropriate knowledge and skills, personal characteristics, professional prospects and motivation if they are to meet the expectations placed upon them”. (Delores, 1996)

Effective mathematics is based on the knowledge in two areas.

1. Content in mathematics can be analysed into content proper (what to teach) and its inner organization, the latter being most closely related to teaching methods.

2. Teaching methods can be analyzed into presentation of the subject matter (use of mathematical models etc.) and organization of class room work, the former being most closely related to content and mathematical modeling. The analogue model of this paragraph as follows:

<table>
<thead>
<tr>
<th>Content</th>
<th>Teaching Methods</th>
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<tbody>
<tr>
<td>Content Proper (what to teach)</td>
<td>Organization of content.</td>
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<tr>
<td>Organization of Content.</td>
<td>Presentation of Content.</td>
</tr>
<tr>
<td>Organization of Classroom work.</td>
<td>Organization of Classroom work.</td>
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One of the biggest problems that affect the quality of primary mathematics teaching around the world is that too many teachers possess minimal qualification in mathematics as well as this, they have negative, and narrow, attitudes towards subject.

Several research studies were undertaken especially under the District Primary Education Programme (DPEP) to identify the factors affecting learning achievement of primary school children (Singh et al., 1995; Varghese, 1995; Saxena et al., 1996) for the benefit of policy makers based on experiences of Indian and Western scholars. An International seminar on “School Effectiveness and Learning Achievement at primary stage” was organized by the National Council of Educational Research and Training (NCERT), New Delhi in 1995. Hence, enhancing the learning achievement of students has received serious attention. In support to this, the World Bank in its report has mentioned, “the most important challenge for primary education in India is
to improve educational outcomes (Primary Education in India, the World Bank, 1997).

Mathematics, by and large, is taught in a stereotyped and mechanical way in schools. "Experience has shown that the majority of students normally fail in Mathematics at the end of class X (NCERT, 2000). Lack of understanding of the subject would create backwardness and phobia in the students. The result is that the students are not only scared but would also like to shun the subject. There are many reasons for the failure and backwardness in the subject, which have to be tackled from many fronts. One such way to tackle the problem is investing research results in the teaching-learning process.

**Role of the teacher**

The educational structure of any country starts with primary education. A strong foundation for education is to be laid at this stage and the teachers at the primary level have to play a pivotal role. From the layman to the philosopher, everyone eulogizes the teacher as the mason who builds the fabric of society, the students being the bricks and mortar of the future. V.S. Mathew says that, “No system of education, no syllabus, no methodology, no textbooks can rise above the level of its teachers. If the country wants to have quality education it must have quality of teachers”.

The teacher is the key factor in any education reform or its advancement, Dr. K.G. Saiyidian observes, “The more I see of educational work-good work and bad work, the more emphatically, I feel that the quality of the teacher in an educational system is more important than all the educational factors put together syllabus, textbooks, equipment, and buildings”.

The UNESCO – ILO Document on status of Teacher (1967) status, “It should be recognized that the advance in education depends largely on the qualification and ability of the teaching staff in general and the human, pedagogical and technical qualities of the individual teachers.”

The performance of good teachers rests upon the specialization of the subject or fields to be taught and the professional knowledge and skills, an understanding of
educational process and teaching skills. In order to keep pace with the changing time, various theories of learning, techniques of instruction psychological principle of learning and teaching, psychology of learners, experiments and research in learning and teachings, etc, should be needed. But if a teacher possesses all these things, and if he/she has an unfavorable attitude towards teaching then all these things would be in vain. So right kind of attitude is necessary for effective teaching. Researchers of teacher effectiveness have established the fact that teachers attitude and teacher effectiveness are positively related (Paul, 1950; Ragoms, 1960; Anand, 1971-79).

The positive dedicated and qualified teacher always brings positive changes in the existing system. Indian education commission (1964-1966) rightly said “of all the different factors which influence the quality of education and its contribution to national development, the quality competence and character of teachers and undoubtedly the most significant.

Blaire’s (1981) Mathematics teaching as an art form – pupils are encouraged to develop their own ideas and discuss in a vocabulary such as one might employ in the critical analysis of an example of any art form the mathematics on which they have been working.

It is generally felt that improvement in the teaching process is of paramount importance. If the teacher teaches in a planned methodical way, it is expected that the achievement of the children is certainly going to be satisfactory.

1.2 CONTENT KNOWLEDGE OF TEACHERS

Mathematics is a creative subject. One of the goals of teaching Mathematics is the development of capabilities in a student and places him in an active role to bring out his initiative and enterprise. Each one should solve problems independently. Solving a problem in Mathematics without assistance is rewarding; also employing the things related. To numbers, points, lines, planes, etc., of Mathematics to new situations is much more rewarding. The inculcation of such habits like creating new algorithms, transference ability, etc., is impossible, if one confines oneself to the framework of mechanical techniques of teaching.
Teaching is a process of communication between persons. This is true of Mathematics teaching and it holds good for every other subject in the curriculum. It is basic to every teaching situation inside or outside the classroom.

The successful teacher needs certain qualities. He must be a master of his subject matter, be a master of his subject matter, and be able to break this down into single, comprehensible steps.

Studies have reported that, importance of subject knowledge in Mathematics plays a vital role in teaching Mathematics to get desirable changes in learners. The National policy on Education (1986) and programme of action reiterated that the teacher is the key for the successful implementation of the new policy and overall improvement in the quality of education.

Arora G.L., Raj Rani, Saroj Pandey (2000) in their article “Training needs of primary school teachers” concluded that inadequate knowledge of teachers in the content and pedagogy of Mathematics made it difficult transact the curriculum in classroom situation.

Buch Aggrawal (1969) titled “Measurement and competence of teachers of primary schools (M.P.)”, has remarked that about of the teachers did not possess adequate knowledge of the subject to be able to teach competently.

In order to investigate systematically the structure, content and style of learning and teaching Mathematics in school, however, one must first recognize its complexity and the need for the classroom teacher to draw on many kinds of knowledge.

Weinhardt (1987) noted the dearth of studies which document how specific subject matter content is taught and learned and over the last decade she, with a variety of colleagues, has begun to map out the relationship between teacher knowledge of Mathematics and instruction, contrasting the competence of novice and ‘expert’ teachers in teaching particular mathematical topics to particular groups of children.

The classroom environment, as Leinhardt, (1983) noted, is complex and dynamix and requires balancing the needs of 20-30 young individuals with the need
to stay on course so material is covered clearly. The teacher’s immediate task is to communicate new information, to review material and ensure material is accessible or to assess children’s knowledge. This is constrained by the need to keep children active, interested and engaged in learning as well as by the constraints of the particular setting related to time availability and other resources. Leinhardt and Smith (1985), Leinhardt et al. (1991) have suggested that whilst many knowledge systems exist fundamental to teaching and learning, two important core areas are knowledge of lesson structure and knowledge subject matter. Subject matter knowledge includes concepts, algorithmic operations, connections among different algorithmic procedures, the subject of the number system being drawn upon, understanding of classes of children’s errors and curriculum presentation. Lesson structure knowledge involves knowledge for conducting lessons, general routines for interaction with children, co-ordination lesson segments and fitting lessons to gather with in the day or with in a topic and across days. Subject knowledge supports lesson structure knowledge providing the content to be taught, accessed during planning and in the course of teaching.

The factor to consider in presenting material effectively to pupils relates to the unique set of experiences, abilities, and interests for each individual. One study, conducted by gross nickel and Brueckner(1963), found a range of approximately four years in ability in arithmetic reasoning and three years in performance on arithmetic fundamentals in typical fifth grade classes. An earlier study by the same team (Brueckner and Grossnickle, 1953) revealed that a single individual could reflect a wide range of ability in different phases of Mathematics. Thus, a teacher must provide for individual differences in Mathematical ability.

1.3 PEDAGOGICAL KNOWLEDGE OF TEACHERS

Teaching is an art and pertains to an act of producing behavioral changes among pupils. Learning takes place when desirable behavioral changes among pupils. Learning takes place when desirable behavioral changes are observed in the learners. In order to make children learn effectively, the teacher has to make use of the right method of teaching. There are some born teachers; yet a majority off teachers who
have no inherent flair for teaching and are unable to arouse interest in the students to learn, can improve upon their teaching by practice and by following various methods of teaching devised from time to time. For choosing a right method for a given situation, the teacher must acquaint himself with different methods of teaching.

In the teaching learning program of a subject, both concept and pedagogy play important roles. As a teacher of Mathematics, master over the content is the first requisite; then he should be to use suitable pedagogy in order to make others understand those very contents, which he/she has already mastered. The teacher should be a master of the pedagogy. Only an expert in both can deliver the goods rightly in classroom situations. Every teacher is expected to develop certain skills, which he needs during the course of his classroom teaching. His duty is to teach Mathematics to the learners. He is able to any carry on his duty well if he has acquired the art of teaching.

Teacher’s awareness of the teaching methodologies and techniques of testing are vital not only for an effective transaction of curriculum in the classroom but also for improving the standers of achievement of children. Bennett and Carre study (1993) did show that there was most improvement when subject knowledge was associated with pedagogical issues, at though enhanced understanding of subject knowledge; Lame about largely through enrichment and restructuring of knowledge already held.

Shulman (1986) provided a stimulus to both aspects of this research. From his work with beginning teachers he argued that different kinds of subject matter knowledge were involved in teaching and he described how teachers’ knowledge of subject matter and pedagogy. Pedagogical subject knowledge incorporates the contest to be taught with knowledge of what children think or know about the content, and knowledge about how the contest can be presented to children in ways likely to increase effectively their knowledge and understanding. As Brophy (1991) has noted, however, pedagogical subject knowledge is influenced also by teachers’ beliefs, and associated values and attitude towards what is involved in teaching, in this case, Mathematics. Similarly, personal theories held by teachers’ about learning and
teaching will influence decision made about the context to be taught. Teachers knowledge is, in a sense, a dynamic process constructed according to the demands of the teaching context, not directly variable are easily separable from beliefs.

Pedagogical knowledge goes beyond subject for teaching. For the teacher this should entail the transformation of subject content into a form children understand. Pedagogical subject knowledge includes knowing what knowledge, concepts, and strategies children bring to learning, their misconceptions as well as their understandings, and the stages through which they pass towards mastery of topics within a subject area. It encompasses informally assessing children’s existing knowledge, pinpointing their misunderstandings, and developing strategies for linking what children know already to what they are learning currently.

As Romberg and Carpenter (1986) have noted we currently know more about how children learn Mathematics than we know about how to apply this to Mathematics instruction. Recent research on teaching, however, has been informed increasingly by knowledge of children’s conceptual development. Such conceptions have been found by Verynaud (1982) to be organized in ‘conceptual fields’ which incorporate problems, situations, relationship, structures, content and operations of thought, built up in daily home and school life, and mastery of which may increase over a long period of time.

On the other hand, that teaching is a form of ‘socializing’ children’s conceptions. In collaboration with the class teacher, Mathematical activities are designed to elicit children’s conceptions through the formulation of problem, which require pupils to act upon and evaluate their constructions through class discourse and debate. The soundness of the methods used is they judged in terms of their effectiveness for use in the classroom setting. Wood et al. (1990), too, have been involved in an ongoing research and development programme, which seeks to develop Mathematics instruction in second grade classroom based on the description and analysis of the Mathematics children construct through interaction with in the home and school environment children are encouraged to recognize their conceptual understanding through activities designed to provide problems solved in a variety of
ways with pair work followed by class discussions in which children explain and justify their interpretations and solutions to their peers.

Clark and Peterson (1986) suggested that teachers do not base instruction and decision making in teaching on their assessment of children’s knowledge or misconceptions. Putnam (1987) argued that the cognitive demand involved in attempting to keep track of all individual and that assessing existing knowledge could not be a primary aim. Further more he proposed that teachers followed curriculum script in which only minor modifications were made in response to pupil feedback.

Various studies conducted by NCERT, NIEPA show that the learning achievement at the elementary stage is quite poor in India (Govind and Varghese, 1993; Shukla 1994). This state of affairs can be attributed to a certain extent to improvement of teachers’ awareness in the previously mentioned arrears. To counteract this educationists have thought of empowering the teachers in different dimensions of the educational process. Even the Delors’ International commission on Education for the 21st century has laid emphasis on this issue and considered it as one of the multipronged strategies for the desired progress in the educational field as it stated in its report.” Improving the quality of education depends on first improving the recruitment, training, social states and conditions of work of teachers. They need the appropriate knowledge and skills, personal characteristics professional prospects and motivation if they are to meet the expectations placed upon them (Delors 1996). Therefore, the onus lies on developing countries to take care of these aspects for teacher empowerment.

Method implies an orderly way of doing something. It is not a casual or chance mode of activity. It grows out of experience, by trial and error, by process of repetition activities, selection of activities and the synthesis of desired ones.

A method is a systematized, organized way of doing a thing for effective control; it is an effective procedure of using experience.

According to J. Remat “Method is an orderly arrangement of materials of instruction as to cause the materials its best effect on the mind of the learner”. Pedagogy needs to be understood as a ‘lived relation of power and knowledge
(Ungar, 1982) in which the teacher ‘performs’ what it means to know things. Cryle (1994) provides the metaphor of the instructor in the erotic arts display(ing) the bodily discipline at work in an erotic “attitudes” as a set of venereal positions”.

In performing knowledge acts for the student gaze, we ought to be able to acknowledge what Deustscher (1994) calls ‘the exhilarating sensation of a physical carnation of one’s body as teacher … the overt pleasure produced by the possibility of one’s own performance as empowered subject of knowledge, the deductive effect of instantaneity between teaching and learning body’. As Deustscher goes on to say, Pedagogy is the site of the dense cluster of intersubjective corporations. The teacher appropriates the body of the student in the occupation of the position of the subject supposed to know… and the student appropriates the body of the teacher in taking up an invested position in relation to the discipline incorporating the teacher’s…internalization of certain convention of method, content, style and technique … all of which the animation of the text by the teacher’s body (1994).

It is through these performance that we are forced to confront the limits of our own material bodies as well as our ‘bodies’ of knowledge. Barthes writes of this recognition of bodily limits as a crucial one for academics:

I can do everything with my language but not with my body. What I hide by my language, my body utters. I can deliberately mould my message, not my voice. By my voice whatever it says, that other will recognize that something is wrong with me…My body is a stubborn child, my language is a very civilized adult. (1978)

Nevertheless, the animation of the teacher’s body through pedagogical events can endow it with special abilities. As Lacan (1988, cited in Deustscher, 1994) put it, ‘You never see any one dumb-struck, once he’s taken up the position of being he who knows’. This animation, in turn, animates both the body of the student and the text. Deustscher that: “Even where the teacher’s role is understood on the most rigid model of purity of transmission, the pedagogical relation between student, teacher and text is very different to the relationship between teacher and text- the teacher adds something, animating the text. To be taught the Ethises or the critique of pure reason
by an inspired teacher is not the same thing as to go to the library and labour one’s way through Kant and Spinoza.

1.4 ATTITUDE TOWARDS TEACHING MATHEMATICS

Mathematics is regarded as an important subject of study at the school stage. The mathematical knowledge and its application is of paramount importance for quality improvement of education. It is a common experience of all of us that many students consider Mathematics a dry and stuffy subject whereas many others consider it an interesting one.

Studies have reported varying degrees of positive attitude among elementary pupils towards mathematics. In one study conducted at the fifth grade level, the pupils were asked to rank their best-liked subjects, and arithmetic was indicated as their first performance (Chase 1949). Another study revealed that predicting achievement based on attitude toward arithmetic could not be done since often below average pupils reflected the enthusiasm or lack of enthusiasm of the teacher (Bassham, et al., 1964).

Philips (1970) hypothesized that attitude towards mathematics has been developed over years. In his study comparing the attitudes and achievements of pupils with the attitude of their teachers in the precious three years, he found that the most recent teacher attitude towards mathematics teaching was significantly related to the pupil’s achievement. Yadav, Changur Prasad (1988) also found similar results.

Teachers are important in helping students to develop positive attitude towards the subject, students’ perceptions of their mathematics teachers towards them as learners of mathematics relate to students’ anxiety (Morris, 1981).

According to Foong (1987), College boys who dislike mathematics view their former teachers as impatient. Poor performance and negative attitudes of students are found associated with restrictiveness and negative use of authority by teachers.

Thus, a major factor influencing pupils’ attitude is the teacher’s attitude toward the subject. The teacher should reflect a positive approach and allow pleasant experiences and memories to be developed since more favourable attitude are formed under pleasant emotional conditions. It is the teacher’s responsibility to create this
type of environment in the classroom and he must begin with his own attitudes and enthusiasm for mathematics.

In our country, the teacher is a revered person, not only for the student but also for the society as a whole. The student and the society used to look up at the teacher for guidance and draw inspiration from him.

Attitude of teachers toward their profession has been prominent area of research during recent time. Success in teaching is dependent on teachers attitude towards teaching profession, his liking towards children, interest in teaching, etc., In the studies conducted by Weber (1953), Symonds (1955) and Tyams (1960) it was found effective teachers have genuine love and strong liking for young people, enjoy being with them and have deep interest in and get satisfaction from the job of teaching. On the other hand the teachers with indifferent attitude rated low in effectiveness.

Sommant Roy (1971) is of the view that teachers personality and attitude towards his profession and ability to adjust, plays a major role in getting satisfaction in job, Quareshi (1972) is of the view that teachers personality and attitude have great impact on his verbal behaviour in class room setting.

The above said studies reveal that the favourable attitude towards teaching profession affects the quality of teaching effectiveness of teachers and success of a educational system.

1.5 TEACHING LEARNING PROCESS – A MODEL

The concern for the improvement of student achievement would also recognize the teacher as a key function. In this regard, a systems model on ‘teaching in context of teacher education institutions’ by Jangira and Das (1986) is of relevance. The various sub components underlying each of the four major components viz., context, presage, process and product are presented in the figure as follows.
The figure reveals that the process component or teaching learning experiences provided is largely determined by the competency of a Teacher competency here would denote the ability of a teacher to select and organize appropriate learning experiences to the students within the available facilities in a school. Similar views are also held by various researchers (Varghese and Govinda, 1993; Shukla, 1995; Varghese, 1995; Saxena et al. 1996; Padhi et al., 1998).

1.6 THE SCENARIO OF MATHEMATICS TEACHING AT PRIMARY LEVEL IN ANDHRA PRADESH

The Andhra Pradesh Government is conducting District selection committee (DSC) to appoint teachers, based on written test in content and pedagogy of all the school subjects taught at primary level. The basic qualifications required for the appointment of primary teachers is 10+2 (Higher Secondary/Intermediate) and Diploma in Education/teacher training course/Programmes of DIETS. The candidates with B.A. / B.Sc. / B.Com / M.A. / M.Com. With B.Ed. / M.Ed. are also eligible for the appointment of primary teachers.
All the primary teachers are required to teach Mathematics compulsory irrespective of subject background. This leads to a situation where some primary teachers are compelled to teach Mathematics without sufficient knowledge of the content and pedagogy. Primary teacher is expected to have basic understanding of nature of subject, methods and techniques of teaching to promote positive attitude among the learners towards learning of the subject.

The teachers are not in a position to use appropriate teaching strategies for teaching of Mathematics at primary level. This leads to negative attitude towards the learning of mathematics, in other words the learners are not motivated properly towards the learning of Mathematics among primary teachers. This is due to lack of knowledge in content and pedagogy of Mathematics. Primary education is the foundation for the structure of education. This is also true in the learning of Mathematics as they have strong basis in Mathematics for the further learning at different stages of school education. Cohen (1983) noted that pupil’s achievement vis-à-vis school effectiveness clearly depends upon effective classroom teaching.

1.7 THE STATEMENT OF THE PROBLEM

The studies reviewed indicates that there are studies on the knowledge of teachers in Content, Pedagogy and studies related to the knowledge of teachers in content and Pedagogy in other subjects at Secondary level. There were no studies related to the Teachers Competence and Learners Achievement at Primary level in Mathematics. This is a major research gap. In order to contribute to this gap, “Influence of Primary School Teachers Competence on Learners Achievement in Mathematics” in Anantapur District of Andhra Pradesh was undertaken. The teaching competence includes content competence of the teacher, pedagogical competence of the teacher and classroom performance in mathematics. The study is an attempt to know the influence of these variables on achievement of V standard students in mathematics. The various teacher personal variables like Sex, Age, Caste, Experience Educational qualification, Management, Location of the school and Type of school along with presage, process and product variables are given in Figure 1.1 which
includes in the present study. The Figure 1.1 provides the details of the problem. This is a kind of diagrammatic representation of the statement of the problem.
Figure 1.1: Schematic Diagram showing the interrelationship of Teacher Competence and Learners’ Achievement

1. **PRESAGE**
   - "COGNITIVE DOMAIN"
     - Content Knowledge
     - Pedagogical Knowledge
   - "AFFECTIVE DOMAIN"
     - Attitude Towards Teaching Mathematics
   - "DEMOGRAPHIC VARIABLES"
     - Sex, Age, Class, Experience, Educational Qualifications, Management, Locales, School Type.

2. **PROCESS**
   - Classroom Performance
   - Teaching Behavior
   - Student Achievement

3. **PRODUCT**
   - Student Achievement
   - Demographic Variables

The diagram illustrates how presage factors influence the process, leading to student achievement, which is then influenced by demographic variables.
1.8 NEED AND IMPORTANCE OF THE STUDY

Mathematics is one of the compulsory subjects at the primary stage. The general experience is that the performance of the pupils at the primary stage is not satisfactory in mathematics. It is also observed that very few pupils develop an intrinsic interest in the subject. The main reason for this is that teaching of Mathematics at the primary level is not so effective as it is expected.

At primary level all the teachers are required to teach Mathematics irrespective of their subject background. Most of them were exposed to Mathematics only up to the matriculation level and where they studied mathematics out of compulsion and not of genuine interest in the subject.

Moreover, a mathematics teacher should have a basic understanding of nature of subject; nature of learner and learning process in Mathematics, aims of education in general and that of Mathematics in particular; methods and techniques of teaching Mathematics; and should have a positive attitude towards teaching of Mathematics.

Quality of Mathematics instruction at elementary school level depends on the preparation of elementary teachers to teach Mathematics. Without sufficient knowledge of Mathematics and Mathematics pedagogy, it is unlikely that elementary teachers will be able to deliver sound Mathematics instruction to their pupils. In addition, the Mathematics teacher should have positive attitude towards both Mathematics and teaching of Mathematics. Otherwise they could not develop positive attitude towards Mathematics in small children. Teachers’ negative attitude may inhibit their learning and may be transmitted to their pupils Mathematics achievement (Larson, 1983; Shofield, 1981).

The primary teachers are supposed to teach all subjects, they should have good knowledge in all subjects and its methodology. However, some of the teachers working in the elementary schools have not studied method of teaching Mathematics. They do not know what, how and when to use the techniques to teach Mathematics. It affects the learners’ achievement in Mathematics and the quality of education.

The quality of teachers influences the level of attainment of the students. As Kothari Commission has remarked, “Of all the different factors which influence the
quality of education and its contribution to national development of the quality, competence and character of teachers are undoubtedly most significant”.

There is little research work done to find the effectiveness of Mathematics education programme on the achievement of students in Mathematics especially at elementary level. Thus, the present study is an attempt to evaluate the primary teachers’ competence knowledge in content and pedagogy of teaching Mathematics in relation to their efficiency in teaching Mathematics and the learners’ performance in Mathematics.

1.9 OBJECTIVES OF THE STUDY

The following are the major objectives of the study.

1. To study the attitude of primary school teachers towards teaching Mathematics.
2. To assess the primary school teachers’ knowledge in content of Mathematics.
3. To assess the primary school teachers’ knowledge in pedagogy of Mathematics.
4. To evaluate the primary school teachers classroom performance in Mathematics.
5. To study the learners achievement in Mathematics.
6. To study the relationship of the teachers attitude towards teaching of Mathematics with a) knowledge in content; b) knowledge in pedagogy; c) classroom performance; d)overall teaching competence and e) learners achievement.
7. To study the relationship of the teachers’ knowledge in content with: a) knowledge in pedagogy; b) classroom performance; c) attitude towards teaching Mathematics; d) overall teaching competence, and e) Learners Achievement in Mathematics.
8. To study the relationship of the knowledge in pedagogy with a) Knowledge in content; b) Classroom performance; c) attitude towards teaching Mathematics; d) overall competency, and e) Learners Achievement.
9. To study the relationship of classroom performance with: a) Knowledge in content; b) knowledge in pedagogy; c) overall competency; d) attitude towards teaching Mathematics, and e) Learners Achievement.
10. To study the relationship between the teacher attitude towards teaching Mathematics, the knowledge of teachers in content and pedagogy, teacher
classroom performance, overall teaching competence and learners achievement with respect to: a) Sex b) Age c) Caste d) Educational Qualification e) Experience f) Management g) Locale h) School type.

11. To study the linear relationship of teachers knowledge in content and pedagogy; classroom performance and attitude towards teaching with learners achievement.

1.10 THE HYPOTHESES OF THE STUDY

In order to achieve the objectives of the study, the following hypotheses were formulated for testing.

1. There is no significant difference in the Content Knowledge in Mathematics among the Primary Teachers with respect to: a) Sex; b) Age; c) Caste; d) Educational Qualification; e) Experience; f) Management; g) Locale, and h) School type.

2. There is no significant difference in the Pedagogical Knowledge in Mathematics among the Primary Teachers with respect to: a) Sex; b) Age; c) Caste; d) Educational Qualification; e) Experience; f) Management; g) Locale, and h) School type.

3. There is no significant difference in the Classroom Performance in Mathematics among the Primary Teachers with respect to: a) Sex; b) Age; c) Caste; d) Educational Qualification; e) Experience; f) Management; g) Locale, and h) School type.

4. There is no significant difference in the Overall Teaching Competency in Mathematics among the primary teachers with respect to: a) Sex; b) Age; c) Caste; d) Educational Qualification; e) Experience; f) Management; g) Locale, and h) School type.

5. There is no significant difference in the Attitude towards Teaching of Mathematics among the Primary Teachers with respect to: a) Sex; b) Age; c) Caste; d) Educational Qualification; e) Experience; f) Management; g) Locale, and h) School type.
6. There is no significant relationship between the teachers Knowledge in Content; Pedagogical Knowledge; Classroom Performance; Overall Teaching Competency, and Attitude towards teaching of Mathematics.

7. There is no significant difference in the Learners Achievement in Mathematics among the Students with respect to: a) Sex; b) Caste; c) Father Education; d) Mother Education; e) Management of School; f) Locale of the School, and g) Type of School.

8. The Content Competence of Teachers is not significant predictor of Learners Achievement.

9. The Pedagogical Competence of Teachers is not significant predictor of Learners Achievement.

10. The Classroom Performance of Teachers is not significant predictor of Learners Achievement.

11. The Overall competency of Teachers is not significant predictor of Learners Achievement.

12. The Attitude of Teachers towards Teaching of Mathematics is not significant predictor of Learners Achievement.

1.11 OPERATIONAL DEFINITIONS OF THE TERMS USED

Influence

According to the oxford dictionary of Advanced learners, “power to produce an effect” or “power to affect its actions, characters or beliefs.

Primary school Teachers

In this study IV standard are considered as the primary level. Teachers working in these schools are called as primary school teachers.

Competence

According to DPEP, Tamilnadu (1996) teacher competence refers to “the right way of convening units of knowledge, application and skills to students” The right way here, includes knowledge of content, processes, methods and means of conveying content in an interesting way, involving the activities of students.
Competence consists of one or more skills whose mastery would influence the attainment of the competency.

In this study, the investigator restricts competence in teaching Mathematics as the knowledge in content of Mathematics, the knowledge in methodology (Pedagogy) of teaching Mathematics, classroom performance in the teaching Mathematics and attitude towards teaching Mathematics.

**Mathematical knowledge of teachers**

Mathematical knowledge refers to the awareness of the facts, the concepts and generalization pertaining to the content of Mathematics of classes I to VII.

**Pedagogical knowledge of teachers**

It refers to the knowledge in aims, objectives, teaching methods, teaching techniques, teaching aids, to prepare a lesson plan, making a test paper according to blue print and analysis of questions, simple techniques to learn Mathematics etc.

**Classroom performance in teaching Mathematics**

It is the ability to teach the subject with ease and precision and ability to convey the Mathematical knowledge to students.

**Attitude towards teaching Mathematics**

An attitude is a mental and neutral state of readiness organized though experience, existing a directive or dynamic influence up to the individuals response to objects and situations with which he is related. (Allport).

An attitude is a relatively enduring organization of beliefs about an object or situation predisposing one to respond in some preferential manner”. (Rokeach, 1967)

In the present study, attitude towards teaching Mathematics has been viewed as the primary teachers’ predictions towards Mathematics teaching in the from of their likes and dislikes expressed on the given attitude scale.

**Learner**

According to the oxford dictionary of advanced Learners, “A person who is gaining knowledge or skill.

In this study V, standard students are treated as learners.
Learners’ achievement

In general, terms, achievement refers to the scholastic or academic achievement of the student at the end of an educational programme. The central focus of all formal educational efforts is academic achievement on the part of the students.

The from achievement which is often naively understood in terms of pupil; score on a certain school test is loose way of understanding the concept of achievement. Achievement in Mathematics, precisely speaking implies the specific learning out comes namely knowledge, understanding, skill and application. It is important to note that achievement in Mathematics is not an independent phenomenon. Rather it is directly influenced by a number of factors some of which are personal to the individual while many others are located in the environment in which learning process take place.

1.12 RESUME OF THE SUCCEEDING CHAPTERS

The thesis consists of five chapters. The first chapter focused on theoretical framework. The second Chapter deals with review of related literature. The third chapter deals with methodology of investigation. The analysis of and its interpretation and testing of hypotheses included in chapter four. The last chapter is of the summary, findings, conclusions and recommendations.