CHAPTER 2
- REVIEW OF RELATED LITERATURE
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“The competent physician must keep abreast of the latest discoveries in the field of medicine, obviously the careful student of education, the research worker and investigator should become familiar with the location and use of sources of educational information.”
-------- Good, Barr, Scates(1941)

“The research for reference material is time consuming but fruitful phase. A familiarity with the literature of any problem helps the students to discover what is already known, what others have attempted to find out, what methods remain to be unsolved” ---Best (1978).

2.0 Introduction

Keeping in view, the importance of the related literature and realizing the necessity and purpose of survey of related literature, the researcher peeps into the literature available concerning different aspects of the study. Since the subject under study is a new one, a close review indicates that only a limited number of studies have been done in the field. The study is aimed at studying analytically the teaching of Mathematics at Elementary Level in Punjab. In this chapter the researches already done in India and abroad related to the different variables of the study have been reviewed. Survey of the related literature has been done from various research articles published in educational journals, published books, unpublished dissertations and theses in various universities of India such as NUEPA, New Delhi; JNU, New Delhi; DU, Delhi; Panjab University, Chandigarh; Punjabi University, Patiala, Rajasthan University, Jaipur and also from the websites related to educational research. Researcher personally visited
the libraries of various universities and reviewed the related literature. Focus has been on those studies which are closely related and give some evidences in favour or against the relationships of all the variables of the present study. What does the research say about their relationships has been organized and presented below under following headings:

2.1 Studies Related to Teaching Aptitude
2.2 Studies Related to Teacher’s Attitude Towards Mathematics
2.3 Studies Related to Teaching Competency
2.4 Studies Related to Achievement in Mathematics of Students
2.5 Conclusion of Review of Related Literature

An attempt has been made to present below, some of the studies to which the investigator could reach. On the whole, there is a paucity of the literature regarding Analytical Study of Teaching of Mathematics at Elementary Level in Punjab.

2.1 STUDIES RELATED TO TEACHING APTITUDE

Adval (1952) conducted a study on teaching aptitude of male and female teacher trainees. In his study, he found that female teacher trainees have greater aptitude in teaching than male teacher trainees. Although there was no significant difference in the teaching aptitude of urban and rural teachers.

Banergy (1956) conducted a research study on the inter-relation of general intelligence and teaching aptitude. In his study, he took the inter-relation of two aspects of training viz., practice teaching and theoretical studies with general intelligence and teaching aptitude on a sample of teachers. He found positive correlation between these variables. There is no significant difference in the teaching aptitude in terms of gender.

Ekstorm (1974) investigated the relationship between cognitive characteristics of teachers, their teaching behaviour and academic success of their pupils. Two major components found as affecting student achievement are (1) Teacher knowledge and (2) Teacher aptitude. In this study titled “Teacher
Aptitude and Cognitive Style: Their relation to pupil performance”, it was found that certain matches between teacher and pupil knowledge, skill, teacher aptitude and cognitive style tend to facilitate pupils learning.

Thakkur (1977) conducted a study of teacher's effectiveness and their educational attitude in relation to their rapport with students and their survival and job satisfaction in the profession. It was found that female teachers have greater aptitude in teaching than male teachers. It was also reported that there exists significant relationship between teaching aptitude and general intelligence.

Ekstorm (1978) studied the relationship between teacher aptitude and knowledge, teaching behaviour and pupil outcomes. It was found that only cognitive style and one aptitude component (level of aspiration) are found related over both grade levels and subject. Good teacher’s aptitude and high knowledge are helpful in the positive pupil outcomes such as their academic achievement.

Mutha (1980) conducted an attitudinal and personality study of effective teachers considering teaching aptitude as the important factor. In his study of effective teachers, it was found that effective teachers have significantly higher scores related to teaching aptitude than ineffective teachers. This study confirms teaching aptitude as a significant predictor of effective teaching as well as good academic achievement of students.

Vyas (1982) studied the relationship of selected factors with teaching success of prospective teachers in Rajasthan. It was found that, female teacher trainees have positive and significant relationship between teaching aptitude. But, teaching success when assessed by "Teacher's Self Rating Measure", found no relationship between teaching success and teaching aptitude of either male or female teachers. There is no significant difference in the teaching aptitude in case of urban and rural prospective teachers in Rajasthan.

Sharma (1984) conducted a study on teaching aptitude, intellectual level and morality of prospective teachers. He studied the effect of sex on teaching
aptitude. No significant effect of sex was found on teaching aptitude. There is no significant difference in the teaching aptitude in terms of gender.

Donga (1987) found that teacher aptitude is not a factor to control the adjustment behaviour of the student teachers. The study suggests that female teacher trainees have more teaching aptitude as compared to male teacher trainees. The study also suggests that female teacher trainees are more adjusted than male trainees. Trainees of different colleges differed significantly in adjustment. Trainees coming from science faculty have the lowest adjustment.

Singh (1987) conducted a comparative study of creative and non-creative pupil teachers in relation to teaching aptitude, self concept and some personal values. He found positive and significant correlation between teaching aptitude and self-concept. There is no significant difference in the teaching aptitude in terms of gender.

Kukreti (1990) conducted a study regarding some psychological correlates of successful teachers. He found that there is a positive relationship between teaching aptitude and success in teaching. It was found that there is no significant difference in the teaching aptitude in terms of gender.

Feezel and Jerry (1993) conducted a study on preparing teachers through creativity games in relation to teaching aptitude. Creative teaching which involves creating innovative lessons, games, materials, and assignments to challenge students, can be stimulated in teacher education students having good teaching aptitude by stirring up their thinking and encouraging them to explore different paths.

Skipper and Charles (1993) conducted a study about the Instructional preferences of pre service teachers at three different levels of Academic aptitude. The study revealed that pre service teachers with good teaching aptitude are different in their preferences for the objectives and teaching methods of humanistic education and this should be recognized in development of Instructional strategies.
Beena (1995) conducted a study on determinants of good teaching aptitude. She found that there exists no significant difference in teaching aptitude between male and female teachers. She also found that teaching aptitude is a significant predictor of teaching effectiveness.

Rodger et. al. (2007) investigated the effects of teacher clarity and student anxiety on student outcomes. In their study, they examined a possible aptitude treatment interaction between teaching clarity and student test achievement. Results revealed significant beneficial main effects for high vs. low teacher clarity for both achievement motivation measures, but no teaching aptitude treatment interaction between teacher clarity and student test achievement.

Yeh (2007) in a study suggested that teachers with high levels of teaching aptitude, C.T. dispositions, CT skills, and Intra personal intelligence as well as those with judicial thinking styles, are mindful, analytical and reflective in their teaching practices and therefore more likely to continually improve their skills in teaching aptitude.

Ranganathan (2008) conducted a study on self-esteem and teaching aptitude of teachers. He found that there is a significant positive relationship between high self-esteem and teaching aptitude and there is no significant different between males and females and the level of self-esteem and teaching aptitude.

Sajan (2010) studied the teaching aptitude of student teachers with respect to their gender and academic achievement at graduate level examination. The sample for this study is selected by stratified random sampling from the Teacher Education institutions of Malabar area of Kerala. Teaching Aptitude Test Battery (T.A.T.B.) developed by Singh and Sharma (1998) is used to measure aptitude in teaching. Analysis of the results show that majority of students have ample teaching aptitude. The female students are found to be significantly better than their male counter parts in teaching aptitude test. The
academic achievements at graduate level examination have no substantial relation with aptitude in teaching.

Holm and Kajander (2012) found in their research that a deep conceptual understanding of elementary mathematics as appropriate for teaching and good teaching aptitude are increasingly thought to be important aspects of elementary teacher capacity. This study explores preservice teachers' initial Mathematical understandings, their teaching aptitude and how the Mathematical understandings developed during a mathematics methods course for upper elementary teachers. The methods course was supplemented by a newly designed optional course in Mathematics for teaching. Teacher candidates choosing the optional course were initially weaker in terms of mathematical understanding than their peers, yet showed stronger mathematical development after engaging in the extra hours the optional course provided. Those who were having good teaching aptitude were better in teaching Mathematics.

Review of related studies on teaching aptitude indicates that it is associated with several attributes which are related to teaching profession. Studies point out the complex nature of teaching aptitude, related variables and extent of relationship between them. Research on teaching aptitude has yielded better understanding about the impact that it has on student’s achievement.

2.2 STUDIES RELATED TO TEACHER’S ATTITUDE TOWARDS MATHEMATICS

Manfred et. al. (1972) conducted an experiment in teaching college Mathematics. The content and operation of an experimental Mathematics course designed primarily to modify and shape attitudes towards Mathematics is described. The resulting attitude of teachers towards Mathematics are positive.

Barry (1981) conducted a study regarding effect of mode of instruction on prospective elementary teachers’ attitudes toward Mathematics. On a Likert scale, 269 prospective elementary school teachers instructed in a seminar workshop approach showed a greater improvement in attitude towards Mathematics than
students in a lecture setting. On the Dutton attitude scale, there were no
differences between instructional techniques nor between pre- and posttest means.

Yi-Guang (1982) conducted a study on college students’ attitudes towards
Mathematics. Attitudes towards Mathematics of college students in Mathematics,
psychology, and other fields were measured. Items describing Mathematics as a
good mental exercise and valuable mental training were selected by more than 55
percent of the students sampled. Overall similarity in attitudes among the three
samples was high. Mathematics was highly valued.

Frank (1983) conducted a study on attitudes toward Mathematics and
school learning in Malaysia and Indonesia: urban-rural and male female
dichotomies. He found that Malaysians have more favorable attitudes towards than
Indonesians. Urban teachers, have more favorable attitudes towards Mathematics
than rural teachers. Males have more positive attitudes towards Mathematics than
females while females have more positive school attitudes than males.

Saburoh et al. (1984) investigated whether attitudes toward school
Mathematics on mathematical achievement differed between low and high
intelligence eighth-grade students in three Japanese schools (N=808). Results
indicate that the attitude of low intelligence students is more important and it
affects more in magnitude than that of high intelligence students.

Patil (1984) studied the relationship between interest, attitude towards
Mathematics and intelligence with teaching in relation with other variables like
achievement, sex etc. of student teachers and found that intelligence, attitude
towards Mathematics and interest are positively correlated with academic
achievement. There is no significant difference in the student teacher’s attitude
towards subject in terms of gender.

Wali (1985) examined the relationship between various demographic
correlates, academic background of teachers and teacher’s attitude towards
subject. Implications for teacher preparation, such as, inculcating proper values,
proper selection and giving due importance to family background have been
drawn on the basis of the study of six factors. There is no significant difference in the teacher’s attitude towards subject and academic background of teachers in terms of gender.

Charles (1989) compared the performance in college algebra for four testing strategy classes: a homework class; a quiz class; a test class; and the control class in relation to attitude towards Mathematics. Adjusted mean scores in performance and adjusted final attitude were not different among the four strategy groups. The test class had a higher attrition rate than the homework class. Males and females do not differ significantly in their attitude towards Mathematics.

Oakley (1992) described a summer Mathematics inservice workshop for 39 elementary teachers from rural, small schools throughout New Mexico. Focused on minority participation, hands-on activities, and improvement of attitude towards the teaching of Mathematics. Post tests revealed improvement in knowledge of manipulative use, confidence in use of manipulatives, and Mathematics anxiety. There is no significant difference in the teacher’s attitude towards Mathematics in terms of location.

Gabriele (1993) examined differences in attitude towards Mathematics of German teachers to verify previously reported differences. Results indicated continuing gender differences in attitude towards Mathematics, perceived importance of Mathematics achievement, and Mathematics career choice; changed views on gender roles. Female German teachers were found to be having more positive attitude towards Mathematics than males.

Bose (1993) studied the correlates of teacher’s attitude towards subject of 160 student teachers and found that positive significant relationship exists between teacher effectiveness and each of the predictor variables like intelligence, teacher’s attitude towards subject, self confidence and previous academic achievement. Those teachers who were having good attitude towards their subject were found to be intelligent, self confident and good previous academic achievement.
Kumar (1996) studied 200 primary school teachers from 30 schools and found that less than 20% of teachers had positive attitude towards Mathematics. Among them male teachers and teachers working in private schools outnumbered their counterparts. Developing positive attitude becomes the responsibility of teacher training institutions and it has implications for quality teacher training programmes.

Xin and Kishor (1997) conducted a study on attitude towards subject, social factors, and achievement in Mathematics: a meta-analytic review. The meta-analysis integrated 143 primary studies on the relationship of attitude toward subject and social factors with achievement in Mathematics. Attitude was decomposed into self-concept about Mathematics, perception of family support, and perception of Mathematics as a male domain. Major findings included: (a) self-concept, family support, and Mathematics as a male domain were all related to achievement; (b) the three relationships did not show significant gender differences; (c) the three relationships consistently decreased from the junior high grades to the senior high grades; (d) the relationship between self-concept and achievement varied as a function of ethnicity, whereas the relationship between family support and achievement was consistent across ethnic background; (e) the three relationships all varied across sample selection; (f) the relationship between self-concept and achievement varied with sample size, whereas the relationships of family support and Mathematics as a male domain with achievement were sample-size invariant; (g) the relationship between self-concept and achievement increased over time, whereas the relationships of family support and Mathematics as a male domain with achievement remained almost unchanged over time; and (h) there were no statistically significant interaction effects among gender, grade, and ethnicity for any of the three relationships.

Stephen et al (1998) discussed part of study stimulated by the continuing debate over differences between boys and girls in their attitudes towards Mathematics and their participation and performance in this subject at school.
They conclude that there were clear differences between boys and girls on their attitude towards Mathematics.

George et al (1998) reported the results of a study aimed at changing prospective teachers' attitudes toward Mathematics using a Mathematics preparatory program designed and implemented over three years and employing questionnaires and interviews. Results showed significant improvement of attitudes, particularly toward the satisfaction from and the usefulness of Mathematics.

Cornelius (2000) investigated the factors affecting teaching competence of teacher trainees at the secondary level revealed that intelligence, attitude towards subject and academic achievement of teacher trainees are the discriminating factors of the different groups of subjects. There is no significant difference in the teacher’s attitude towards subject, teaching competency and intelligence in terms of gender and location.

Smith and Kenneth (2000) conducted a study on Self Concept, verbal academic achievement and attitude towards subject of primary and secondary student teachers. Results revealed that significant difference between the two cohorts of student teachers on the self reported measures of self concept and text anxiety. The results also reveals that verbal academic self concept has significant and positive direct effect on verbal academic achievement. The indirect effect of verbal academic self concept and attitude towards subject mediated by worry component of test anxiety, is found to be significant for secondary student teachers. Results supported the proposition that an individual's self concept has a major direct influence on the worry component of test anxiety and in addition, a more dominant direct effect on verbal academic achievement.

Yeung and Watkins (2000) investigated twenty seven student teachers' personal sense of teacher’s attitude in Hong Kong. The results pointed out that teacher’s attitude is viewed in terms of the dimensions of concern for instructional participation and learning needs of pupils, communication and relationship with
pupils, academic knowledge and teaching skills, lesson preparation, management of class discipline, teaching success, commitment and a sense of self confidence. There is no significant difference in the teacher’s attitude towards subject in terms of gender.

Markku (2002) suggested a new framework for analyzing attitude towards subject and changes in attitude. This study identified four different evaluative processes as aspects of attitude: (1) emotions aroused in the situation; (2) emotions associated with the stimuli; (3) expected consequences; and (4) relating the situation to personal values. This study illustrates the usefulness of this analytical framework using an exemplary case study. There is no significant difference in the teacher’s attitude towards subject as related emotions in terms of gender.

Xiaoxia (2002) focused on gender differences in growth in Mathematics achievement in relation to various social-psychological factors such as attitude towards Mathematics, self-esteem, parents' academic encouragement, Mathematics teachers' expectations, and peer influence. Results indicate that gender differences in growth in Mathematics varied by the student's initial status in Mathematics.

Amorim (2004) performed action research with the aims of improving primary school student teachers (STs)' understanding of, and attitudes towards Mathematics. The teaching strategies used to help STs improve their understanding and attitudes towards Mathematics were similar to the ones suggested for their future use in teaching children. The data indicated that most STs improved their understanding. Some also said that they had improved their liking for the subject and their remarks clearly demonstrated a connection between the affective and cognitive domains. Yet others said that their attitudes towards Mathematics had not changed much. The two main aims of this action research remain incompatible in the perception of some of these STs. There is no significant difference in the teacher’s attitude towards Mathematics in terms of gender.
David et al. (2005) conducted a study on evicting scientific understanding of prospective elementary teachers: role of gender, education level, courses in science, and attitudes toward science and Mathematics. A multiple regression analysis of the relationship between prospective teachers' scientific understanding and Gender, Education Level (High School, College), Courses in Science (Biology, Chemistry, Physics, Earth Science, Astronomy, and Agriculture), Attitude Towards Science, and Attitude Towards Mathematics is reported. Undergraduate elementary science students (N = 176) in an urban doctoral-level university in the United States participated in this study. The results of this study showed Gender, completion of courses in High School Chemistry and Physics, College Chemistry and Physics, and Attitudes Toward Mathematics and Science significantly correlated with scientific understanding. Based on a regression model, Gender, and College Chemistry and Physics experiences added significant predictive accuracy to scientific understanding among prospective elementary teachers compared to the other variables.

Konstantinos et al (2007) attempted to answer the questions related to the attitudes of student teachers of the Department of Early Childhood Education at the University of Patras (Greece) towards Mathematics, as well as their views on the instruction of Mathematics in Early Childhood Education. The research sample included 52 students in the fourth semester of studies, who were invited to answer a questionnaire with respect to Mathematics and its instruction. The findings reveal the negative attitude towards Mathematics by the research subjects. Their epistemological views on Mathematics and its instruction do not constitute a single and solid conceptual system. These findings underline the need to improve the mathematical education offered to student teachers of Early Childhood Education. Although there is no significant difference in the teacher’s attitude towards Mathematics in terms of gender.

Orhun (2007) conducted a study aimed to investigate whether there is a relationship between gender and learning style, mathematical achievement and
attitude towards Mathematics. The subjects of this study were 5th-semester students (42 females, 31 males) from the Mathematics Department at Anadolu University. The results of this study suggest that there were differences among learning modes preferred by female and male students, their mathematical achievements, and their attitudes towards Mathematics. Mathematics achievement and attitude towards Mathematics were not, themselves, dependent on gender. It was also noticed that while female students most preferred the Convergent learning style, male students most preferred the Assimilator learning style. No students were observed to prefer the Accommodator learning style in both groups. Males had greater positive attitude towards Mathematics than females.

Michael (2007) conducted a study on the effects of different undergraduate mathematics courses on the content knowledge and attitude towards mathematics of preservice elementary teachers. This paper analyzes the impact of a content course intervention. When compared to a control group, the experimental group had a significantly more positive attitude toward Mathematics. When previous achievement was partially controlled for, the experimental group scored significantly higher than the control group on a measure of content knowledge.

Akinsola et. al. (2007) conducted a study on the effect of simulation-games environment on students achievement in and attitudes to mathematics in secondary schools. This study sought to determine the effect of simulation-games environment on students' achievement in attitudes to Mathematics in secondary school. Data was collected from a sample of 147 students in senior secondary school in Osun-State, Nigeria. t-test and analysis of variance were used to analyze the data collected for the study. The finding reveals that students' poor academic achievement in Mathematics is partly due to the method of teaching used. Also, the findings revealed that, the use of simulation-games environment led to improve achievement and positive attitude towards Mathematics. The study conclude that teachers' use of stimulating teaching methods would go a long way in sustaining and motivating students attitude in learning Mathematics.
Erdogan (2008) conducted a study to see the effects of designing webquests on the motivation of pre-service elementary school teachers. The purpose of this study was to examine the effects of webquest-based applications on the pre-service elementary school teachers' motivation in Mathematics. There were a total of 202 pre-service elementary school teachers, 125 in a treatment group and 77 in a control group. The researcher used a Likert-type questionnaire consisting of 34 negative and positive statements. This questionnaire was designed to evaluate a situational measure of the pre-service teachers' motivation. This questionnaire was used as pre- and post-tests in the study that took place in two semesters. It was administered to the participants by the researcher before and after the instruction during a single class period. The paired-samples t-test, the independent-samples t-test and analysis of covariance were used to analyse the quantitative data. The study showed that there was a statistically significant difference found in participants' motivation between treatment and control groups favouring the treatment group. In other words, the participants who designed the webquest-based applications indicated positive attitudes towards Mathematics course than the others who did the regular course work. There was no significant difference in the teacher’s attitude towards Mathematics in terms of gender.

Akinsola et. al. (2008). In this study the results of a comparative longitudinal study investigating changes in girls’ and boys’ attitudes towards Mathematics, and self-confidence in Mathematics are presented. A 5 point Likert scale, AMMEC, was used to measure attitudes towards Mathematics (AM), computer-based Mathematics (AMC), and self-confidence in Mathematics (CM). A total of 430 students using technology for Mathematics and 109 students not using it were monitored for 3 years. At the beginning of the study, the participants were aged about 13 years. The statistical analyses of the data showed few gender differences in the way student’s attitudes towards Mathematics and self-confidence changes over the 3 years. Significant gender differences favouring boys were found in attitudes towards Mathematics in grades 8 and 9 for the group
using technology. For the group using technology, significantly more boys than girls got high scores in attitudes towards computer-based Mathematics in grade 7. Significantly, more girls using technology then girls not using it got high scores in grade 8. The use of technology did not have a positive impact on students’ self-confidence. Regardless of whether they used computers or not, from grades 7 to 9, there was a decrease in the self-confidence in Mathematics of both boys and girls. To enrich these results and detect possible gender differences in the way attitudes were constructed, 12 girls and 13 boys were interviewed at the end of the study. The analysis of the arguments they presented to explain and justify their attitudes towards Mathematics, computer-based Mathematics, and their self-confidence in working in Mathematics provided evidence of important gender differences in the ways in which boys and girls construct their attitude, indicating how their constructions reflect the gender stereotypes within Mexican society.

Renuwat et al. (2009) This study was designed to compare the effects of Team Assisted Individualization (TAI) and Student Teams-Achievement Divisions (STAD) on fourth grade students’ academic achievement in and attitudes towards Mathematics. Seven classes of a school were randomly selected for this experimental study. Two of these were given instruction through TAI; two through STAD, and the remaining three were treated as a control group. For the purpose of the data analysis regarding academic achievement, the 3X1 covariance analysis was used to compare the groups. As a result of this comparison, both the TAI and STAD methods were found to have positive effects (d = 1.003 for TAI and d = 0.40 for STAD) on students’ academic achievement in Mathematics. The pairwise comparisons showed that the TAI method had a more significant effect than the STAD method. The scores for the attitude towards Mathematics were analyzed by using non-parametric statistics. As a result of this analysis, no significant difference was observed regarding students’ attitudes towards Mathematics.

Anastasios et. al. (2009) conducted a study with an aim to investigate the complex relationship between students' Mathematics confidence, confidence with
technology, attitude to learning Mathematics with technology, affective engagement and behavioural engagement, achievement, gender and year level. The participants were secondary students from state co-educational schools in Metropolitan Athens, Greece. Gender differences as well as differences between year levels and the resulting clusters of students were investigated by using a MANOVA. It was found that boys expressed more positive views towards Mathematics and more positive views towards the use of technology in Mathematics, compared to girls. It was also found that high achievement in Mathematics was associated with high levels of Mathematics confidence, strongly positive levels of affective engagement and behavioural engagement, high confidence in using technology and a strongly positive attitude to learning Mathematics with technology. Low levels of Mathematics achievement was associated with low levels of Mathematics confidence, strongly negative levels of affective engagement and behavioural engagement, low confidence in using technology, and a negative attitude to learning Mathematics with technology.

Dolores et al (2009) examined changes, if any, in three cohorts of general education teacher candidates' (n = 13, n = 8, n = 5) attitudes toward teaching Mathematics to students with disabilities after participating in focused instructional experiences which provided both information and vicarious positive teaching activities in special education. Data collected included pretest and posttest scores for each of the three cohorts and journal entries. Little or no change in attitude towards Mathematics, and efficacy to teach students with disabilities was observed for the year one and year two cohorts. In the third year the modules were combined with a structured field experience. The data collected from the third year cohort suggested a positive trend in attitude as measured by the survey data and field experience journal data. There was no significant difference in the teacher’s attitude towards Mathematics in terms of gender.

We can sum up that review of related studies on teacher’s attitude towards Mathematics indicates that it is associated with several attributes which are related
to Mathematical achievement of students. Studies point out the complex nature of teacher’s attitude towards Mathematics, related variables and extent of relationship between them. Research on teacher’s attitude towards his subject has yielded better understanding about the impact that it has on student’s achievement.

2.3 STUDIES RELATED TO TEACHING COMPETENCY

Biddle (1964) made an important landmark research in this field and offered a model for variables involved in teacher competency, research keeping in mind that teacher competency is establishing relationship between teacher behaviours and teacher effects. The problem was complex as teacher pupil interaction was embedded in historical, social, physical contexts that constrained and interacted with it. It was compounded on examining the short range and long range effect. Such considerations suggested a variable system composed of seven classes which are (i) Formative experiences, (ii) Teacher properties, (iii) Teacher behaviours (iv) Immediate effects, (v) Long term Consequences, (vi) Classroom situations and (vii) School and Community Contexts. There is no significant difference in teaching competency in terms of gender.

Agrawal (1969) conducted a study on measurement of competence of teachers of primary schools of M.P. The major objectives of the study were (i) to develop and validate a tool to measure the competence of teachers on process criteria and measure their teaching competence (ii) to assess the classroom teaching competence of teachers with reference to product criteria (iii) to measure intelligence, teaching abilities and subject knowledge of teaching abilities and subject knowledge of teacher presage criteria. The study revealed (i) more than 53% of the teachers were not intelligent enough to be teachers, and intelligence was significantly and positively related to subject knowledge (e=0.42) (ii) of the primary teachers 52.6% did not like teaching profession and their attitude was significantly related to competencies of classroom teaching (iii) 70% teachers passed in their third division and about 50% teachers did not possess adequate knowledge of subject to be able to teach competently.”
Noah and Eckstein (1974) concluded that the home background of children as measured by father’s education and occupation, mother’s education, teacher’s competency and number of books in the home stands out as an internationally strong variable. Few of the directly school related variables such as sex of teacher, teacher’s competency and training, size of school, quality of home work and type of curriculum come through as important in all the nations tested. There is no significant difference in teaching competency as related to academic achievement in terms of gender.

Passi (1976) studied teaching competency of secondary school teachers in Indore. The objectives of the investigation were (i) to study the relationship between teachers demographic variables, sex and age at secondary level (ii) to study relationship between other presage variables such as teacher attitude towards teaching, interest in teaching competency (iii) to study the relationship between teaching competency of secondary school teachers in terms of mathematical achievement and pupil liking of the teacher behaviour of their teachers. (iv) to develop instructional material for one of the identified teaching competency. The findings Major finding of the study were: Firstly, Fourteen factors were identified and interpreted as general teaching competencies which were: competency of teachers concern for students, Competency of using audio-visual aids, competency of professional perception, competency of illustration with examples, pacing while introducing, logical exposition, classroom management, use of questions, initiating pupil participation, use of blackboard, recognition of attending behaviours, achieving closure, giving assignments. Secondly, opinions expressed by students gave nineteen teaching behaviour liked by students such as interest, curiosity, difficult questions, clear explanation, keeping students attentive, place of teaching, experiments, interesting examples etc. Thirdly, the competencies identified through factor analysis rated closely with those expected of teachers by students.
Gupta (1977) focused in his article “Role of education programme in teacher competency” that teaching competency is the more essential availability required for an effective and successful teacher.

Rama (1979) identified teaching’ competencies among secondary school teachers addressing the questions of desirable competencies required of a physics teacher of standard IXth and also specific teacher behaviour describing each of these competencies. In order to answer these questions, the study adopted two approaches. First, the different presage, process and product variables were factors analyzed to arrive at the set of desirable teaching competencies and second the view expressed by the students of the physics teachers were content of the studies. The competencies identified were: (i) giving assignment, loud reading, clarification, secondary loud reading, using blackboard, using reinforcement, pacing, avoiding repetition, consolidating the lesson, dealing with pupil responses, improving pupil's behaviour, audibility, using secondary reinforcement, recognizing pupils, attending behaviour, presenting verbal mode and shifting sensory channel (ii) male and female teachers did not differ in competency. There was a significant negative correlation between the self perception of language teachers and teaching competency (iii) there was a significant positive relationship between teachers’ teaching competency and liking of their pupil of their teaching behaviour.

Mathew (1980) attempted to identify desirable teaching competencies of physics teacher in context of presage, process and product variables. The study adopted two approaches, the different presage, process and product variables of teaching were measured and factor analyzed to arrive at the set of desirable teaching competency. Secondly view of the student of physics teacher was developed. Different variables included in the study were four presage variables, 86 teachers’ classroom behaviour under process variable, on product variables. Four presage variables studied were intelligence, teacher's attitude towards teaching, teacher's self perception of classroom behaviour. The product variable
was student liking of their teacher analyzed and profile of competent physics teacher was developed in order to validate the findings of the first method. The result showed that 14 factors accounted for 68.30% of total variance. The various related factors were (i) general teaching competency (ii) competency of teacher’s concern for students (iii) Competency of using audio-visual aids (iv) Competency of professional perception (v) competency of giving assignments (vi) competency of illustrating with examples (vii) competency of logical exposition (viii) competency of classroom management (ix) use of questions (x) competency of use of blackboard (xi) competency of recognizing attending behaviour (xii) competency of achieving closure.

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identified through factor analysis rated closely with those expected of teachers by students.”

Natrajan (1984) investigated a competency based programme in teacher education curriculum. The objectives of the study were to study the relative efficacy of competency based teacher education in the pre-service education programme of secondary school teachers and to identify factors influencing competency achievement such as social status, economic status and level of education. Natarajan found that teacher education programmes could be made more effective through a competency-based approach.

National Policy on Education (1986) has also recommended that norms of accountability should be strictly followed with incentives for the good performance and good teaching competency and disincentives for the non performance and poor teaching competency. Teacher education through suggested reforms under NCTE may produce human teacher resources for better and brighter self-reliant future India. Teacher education is the vehicle for preparing those who wish to practice in the teaching profession and become competent teachers.

Das and Jangira (1988) examined the effect of intervention training in the integration of the teaching competence of student-teachers. The objective of the study was the vicarious integration and summative, additive and diode model of integration of teaching skills. The study indicated that out of the four colleges of education which compared the summative model of integration intervention with vicarious integration, the differences in the mean gain scores were found to be significant only in the case of one college. It was also found that the only institution which tried out diode skill integration intervention revealed significant mean gains on the general teaching competence of the student-teachers.

Lockheed et.al. (1989) conducted a study about family effect and teacher’s competence on Students’ achievement in Thailand and Malawi. They found that family background, teacher’s good teaching competency and prior achievement affected students’ educational expectations, perceptions of ability and effort which
in turn influenced subsequent achievement. There is no significant difference in the achievement as related to teaching competency with respect to the gender.

Singh (1989) conducted a study on relative effectiveness of two training strategies in developing teaching competence and attitude towards teaching among student-teachers. The objective of the study was to compare the relative effectiveness of two strategies in developing competence and attitude towards teaching among students-teachers and concluded that both the training strategies were significantly effective in developing theoretical understanding of micro teaching, general teaching competence and attitude towards teaching.

Chaudhary (1990) identified the competencies required of a teacher teaching English at secondary school level and also relationship with presage variable of teacher's intelligence attitude, interest, self perception and also relationship of competencies with product variable of pupil achievement in English and pupil liking for the teachers. The findings show that presage variables is a strong determinant of teaching competency. The product variables of pupil achievement also emerges as a valid and important reiteration in this study. Self perception of teachers has no relationship with any competency. The product variables of pupil liking for teacher is significantly associated with only one competency.

Jeannie' studies (1990) examined the way the nation’s educational system distributes opportunities to learn mathematics and science among various groups of students as related to teachers’ competence. Participation and achievement in mathematics and science by women, minorities and the poor, especially in inner cities, have fewer opportunities to learn science and mathematics because of the school they attended as well as good teaching competency. Achievement in mathematics depend upon good teaching competency of teachers. There is no significant difference in the achievement in Mathematics of students as related to teaching competence in terms of gender.
Basi (1991) conducted a study of the teaching competency of language teachers in relation to their job-satisfaction, locus-of-control and professional burnout. The objective of the study was to study the difference between various groups of language teachers on the basis of sex, background of school, type of school, the language taught by the teachers and their tenure of service. The findings reveals that female teachers, urban school language teachers, and higher secondary level language and higher secondary level language teachers were found to have more teaching competence, more externally controlled satisfied with their jobs than the rural and high school language teachers.

Kumar (1991) studies teacher competency among different group of teachers in relation with personality traits. The objectives of the study were to determine teacher competency among different groups of teachers - Arts, Commerce, Mathematics and Correlate it with personality traits. The result of the study show that no relationship exists between teachers competency and personality traits.

Srivastava and Dube (1991) developed scientific equation to predict teacher’s competency in context of personality traits. The correlation between personality traits and teacher competency varied from 0.4129 to 0.16166 in case of high integration of teaching skills and from 0.77156 to 0.7516 in low integration of teaching skills.

Thiagarajan et al (1995) studies the relationship between teacher competency as perceived by students and achievement in economics as a function of sex. Finding revealed a significant correlation between teaching competency and achievement. The magnitude of correlation was different in boys and girls.

Burdsal et al (1999) studied the dimensions of students' perception of teaching competency. The factor identified were (i) First order-Rapport with students - This defined students' perception of the instructor's ability to produce a rapport in the classroom that creates an atmosphere conductive to leaning. Instructors who scored high on this factor apparently encouraged students to
express their opinion freely, the instructors for one to one conversation (ii) Second factor - Course value - How students value course and perceived usefulness of the course was related to report with students (iii) Third factors - Course organization and design- Instructors preparedness of presentation. Instructors whom students soul as prone to delivering ill prepared lectures, using inappropriate methods scored Row (iv) Fourth factor was fairness in grading.

Chardenas (2000) reported that teachers working in an open school climate were better in teaching competency and teacher effectiveness than those employed in school with autonomous, familiar controlled and class climate. Competent teachers had a positive impact on the academic achievement of students.

Arora (2000) while assessing the primary teachers training and teaching competency needs revealed that teachers turned out by teacher training institutes are by and large ill prepared for tasks they are required to perform in schools. Studies revealed that they get reality shocks when they assume positions in school after completing initial teacher training. This is due to the fact their training was far removed from the real work place situation of teachers. The professional training need emanates from the gap between the actual performance and the desired level of performance. Need is a discrepancy between what is and what ought to be.

Alam (2001) in his study witnessed significant and positive correlation between, teaching competency, socio-economic status and academic achievement, negative relation exists between anxiety and academic achievement. Positive relationship is found between teaching competency, achievement motivation and academic achievement of Muslim and Non-Muslim children. Teaching competency as well as Socio-economic status go along with higher achievement motivation.

Kumaraswamy and Sudha (2004) conducted a study on competency of teachers of differential organizational climates. The objective of the study was to examine the effect of the organizational climate on the competency of primary and
high 91 school teachers. They found that teachers working in open, controlled closed climates were found to be more competent in the interactive dimension than the teacher of paternal climate teachers of open climate were found to be better in this competency than the teachers in ‘closed’ climate and also of the autonomous climate.

Saini (2005) investigated the difference in family environment, teaching competency in their schools and academic achievement of adolescent children. In total 415 adolescents were selected randomly for eight government and private schools of Chandigarh. It was found that family environment and teaching competency in their schools of adolescent children were significantly different. It was found that the children taught by competent teachers were better in academic achievement than non competent teachers.

Kukreti et. al (2005) conducted a study on value and teacher competence: a co-relational study. The objective of the study was to study the value pattern of the competent and incompetent teachers. The study was based on a sample of 60 secondary schools of Banswara district and found that there is no significant difference between the value pattern of competent and incompetent teachers of secondary schools.

Kalia (2006) focused that elementary teachers and elementary principals found teacher preparation programme in Texas doing the more effective job in the competencies of the teaching method of strategies and students academic level.

Sharma (2006) found the relationship between general teaching competency and professional interest. It was found that teaching aptitude of the pupil teacher was significantly correlated with their general teaching competency, it is also find that general teaching competency and professional interest of the pupil teacher significantly affect their aptitude. It was also found that teaching aptitude of the teacher was significantly correlated with their general teaching competency, pupil professional interest and mathematical achievements.
Tournbeli (2007) shows that the academic achievement of any student or society in general does not just emerge but with a combination of prevailing variables. There are numerous factors influencing academic achievement. These include school quality, teacher competency, poor implementation of policy on education, school environment and provision of resources. Other research findings have shown that individual characteristics such as motivation, orientation, self-esteem, self-concept, emotional intelligence, self-efficacy and learning approaches are important factors influencing academic achievement.

Zeichner et.al. (2008) found competency among teaching student Teacher. The study reveals that professional interest of the prospective teacher affects the general teaching competency of the teacher. It is also found that teaching attitude of the teacher also concerned with general teaching competency. It was found that general teaching competency directly and indirectly is effected by professional interest and teaching aptitude.

Sabu (2010) conducted a study on in-service training programmes and teaching competence of teachers. The objective of the study was to understand the teaching competence of 92 teachers with regard to in-service training programmes, age, gender and type of school. The sample selected for the investigation comprised 631 teachers of 24 secondary schools in Kollam district of Kerala. Sabu concluded that there is no significant difference in teaching competence of teachers with regard to number of in-service programmes attended, age, gender and type of school.

The review of related studies on teaching competency indicates that it is associated with several attributes which are related to Mathematical achievement of students. Studies point out the complex nature of teaching competency, related variables and extent of relationship between them. Research on teaching competency has yielded better understanding about the impact that it has on students’ achievement.
2.4 STUDIES RELATED WITH ACHIEVEMENT IN MATHEMATICS OF STUDENTS

Fraser (1959) found that parental education and reading habits, income, occupation and leaving space as well as teacher’s attitude and competency were related with school performance. It is the motivational sphere, parental attitude towards education, teacher’s attitude and teaching competency were all significantly related with performance.

Rao (1965) investigated the factors related to scholastic achievement. He found that intelligence; study habits and school attitude were significantly related to the prediction of scholastic achievement. The multiple correlation co-efficient between achievement scores and the scores of intelligence, study habits and attitude towards school was 0.81 which was quite high.

Mokovich (1967) tried to investigate the relationship between student’s attitude and academic achievement in high school. The sample of this study consisted of 61 boys from the Berkeley Public School, California. The instrument used to determine attitude was the invention of choice developed by Edwan and Wilson. He found that prudent students had an extra advantage over all other groups being constantly superior, not only in the prudent subjects but all.

Sinha (1967) conducted a study on high and low achievers and found that when the effect of intelligence was partial led out, academic achievement was found to be significantly related positively to achievement motivation and manifest anxiety, but the relationship between extroversion and academic achievement as well as that between neuroticism and academic achievement were found to be of no significance.

Jain (1967) attempted to observe the study habits and academic achievements of college students. The study habits inventory was developed with 190 statements from eight area viz. understanding, planning, working habits, note taking, concentration, interest in studies, memorization and consultation habits. The scores on the study habit inventory correlated significantly and positively with attainment.
Maunan (1968) conducted a study to explore the effects of academic achievement, instructional set and sex on the performance of an intelligence test. The sample of the study included 104, 11th grade students of India. T.A.T. like tests of McClelland et. al. were used to obtain the student’s need achievement scores and their Otis I.Q. Scores were obtained from their school record. The results showed a non-significant relationship between intelligence and academic achievement.

Horace (1968) found the comparison of attitude towards school, self-perception and achievement of 8th grade students attending junior high schools. In communities of different levels of economic affluence, eight homogeneous groups of 8th grade pupil from each school are selected. To determine attitude towards school, two forms of Stern’s Need –X Press Indexes which are modified for use as attitude questionnaire were used. The Emerson Junior High School is selected to represent the community of higher economic affluence and the Joy Junior High School-the community of lower economic affluence. The findings for good academic achievement in schools are:

- A school where things are for thoroughly rather than acted upon the spur of moment and where teachers and pupil are usually calm and unemotional.
- A school where pupils are encouraged to be thoughtful, imaginative concerned about the future and interested in the sensory and aesthetic experience, people, political issues and the scientific aspects of world around them.
- A School which stresses practical activities and usefulness at the subject matter and where purposeful activity is indulged in by pupils where help is readily available before pleasure seeking.
- A school which is concerned about the safety and well being of its pupils, where help is readily available.
Moreno (1970) sought to determine the effect integration on the aptitude, achievement, attitude towards school and class and social acceptance of Negro and White pupils in a small urban school system. His sample consisted of 263 4th grade students in New York. The question posed by Moreno was if there was any significant correlation between the mean scores obtained at 4th grade level on measure of academic achievement and attitude towards school. He found that although the White students significantly had higher achiever than Negro students, all the sub-group showed positive attitude towards school. The study also showed that initial integration of segregation of Negro or White pupils were not associated with better achievement, initial segregation of White children was associated with a more positive attitude towards school but with lower acceptance of Negro pupils. Academic achievement depends upon the race also.

Flax (1971) studied the relationship between measured academic achievement and social competence among 50 educated, mentally retarded children and concluded that educationally retarded children did not differ significantly from normal children in relation to acting out behavior and leader oriented behavior.

Behl (1972) investigated into the study habits, family background and academic achievements of 11th grade students in relation to sex. Her findings revealed no significant relationship between academic achievement and general study habits on Jamuar’s study habit inventory, but a significantly high and positive correlation was found between some study habits and academic environment \( (r = .64) \). But there was no statistically significant difference between male and female students with respect to home study habits.

Jamuar (1973) in a study investigated on study habits of intermediate Arts and Science students of Patna University in relation to their intelligence and academic achievement, personality and family background. He found statistically significant correlation between study habits and academic achievements.
Bindu (1974) studied the academic achievement of Scheduled Castes in U.P. The major objectives of the study were (i) To investigate into the progress in literacy & education of the S.C. since independence, especially during the plan period. (ii) To compare the educational development of the Scheduled Castes with that of general population in respect of rate of progress & the area of gap. (iii) To examine the effectiveness in implementation of different welfare schemes & their corresponding contribution to educational development of the Scheduled Castes. There is no significant difference in the academic achievement of Scheduled Castes in terms of gender and location.

Pimpley (1974) studied the educational problems of schedule caste students in the Punjab schools. The study aimed at surveying the socio-economic background of the S.C students from the Punjab. The investigator tried to assess the state of the S.C. students, their performance at school, their feeling of the social distances, their opinion at the facilities for them and thereby tried to show how these factors could be problematic in their educational aspirations.

Afif (1977) studied the effect of accommodating learning style on students achievement in Mathematics and found that male students had higher achievement scores than female students in Mathematics. Major Findings of the study were(1) remedial teaching had significant effect on achievements, (2) study habits also changed with remedial teaching, (3) The experimental group of students taught with remedial teaching exhibited better study habits, (4) Intelligence and treatment did not interact significantly leading to the result that the two variables were independent to one and other with respect to study habits.

Thandani (1984) conducted research on a sample of 101 socially deprived students of class 10th, selected randomly from different schools of Ajmer District, to find relationship between achievement motivation and academic achievement. Their annual examination marks of Class 9th were taken as their achievement scores. Achievement motivation test by Prayag Mehta was administered to them and scores on achievement motivation were grouped under high average and low
groups. Means of academic achievement in relation to high average and low achievement motivation levels were 52.81, 48.17 and 38.09 respectively. The critical ratio signifying the significance of difference between means of three achievement levels i.e. high, average and low were 6.6, 8.1 and 7.7. All these values were significant at 0.01 level. Thus, it is clear that achievement motivation has significant influence upon academic achievement.

Kolhe (1985) conducted a research on construction of attitude scale and measurement of attitude of students of Jalgaon district towards mathematics fourth survey of research in education. The major findings of study (1) the students had favourable attitude towards algebra geometry and mathematics as a whole, (2) there was a significant differences between the attitude of urban and rural student towards mathematics and algebra irrespective of sex, (3) urban boys had more favourable attitude towards mathematics as a whole than rural boys, (4) There was no significant difference between attitude of urban girls and rural girls regarding algebra and geometry. There were significant differences between the attitude of urban boys and urban girls towards mathematics as whole. There was significant differences between the attitude of rural boys and rural girls towards mathematics as whole.

Kingra(1986) conducted a research study which involved a sample of 9th class students selected randomly from six rural schools of Ludhiana District. Rao’s achievement motivation test was administered to the subjects and their marks in middle standard examination were taken as their achievement scores. It was concluded that there is significant negative correlation between achievement motivation and academic achievement and only negligible number of high achievement (2 – 70%) was in the inferior level of intelligence (10 – 88%) and below.

Singh (1986) undertook a study on academic motivation among high school students in relation to academic achievement and sex. The purpose was to study the interaction effect of sex and academic achievement on academic motivation. A
sample of 100 boys and 100 girls were given Kerla Academic Motivation Questionnaire by J.Hartley and Halt and F. Hogarath. The study revealed that sex has no relationship with academic achievement and academic achievement is not significantly related with academic motivation. Boys do not differ significantly from their girl counterparts on academic motivation.

Sandhu (1986) studied the caste difference in intelligence and academic achievement. The study was conducted on rural students of high schools of Punjab. He found that scheduled castes and backward classes students are inferior to the general category of the students. Thus, lowering of academic standards for these castes regarding admission and recruitment purposes seems to be simply leveling them inferior to others, which is developing hatred and jealousy among others. But they need actually are motivation and conducive environment for studies.

Singh (1987) investigated the study habits of scheduled castes adolescents in relation to their intelligence and academic achievement. The sample consisted of 100 boys and 100 girls doing 9th class. Study habits inventory by P.V.Patel and T.A.T. test adopted by Prayag Mehta were used as tools. He found that scheduled castes adolescents differ significantly at different levels of intelligence. Students with high intelligence level have better study habits in comparison to students with low intelligence level. The triple interaction among sex, intelligence and academic achievement in relation to the study habits of adolescents is not significant.

Gupta (1989) took a study of 9th class boys and girls in relation to their achievement motivation and academic achievements. 310 boys and 312 girls were given achievement motivation test constructed and developed by the investigator himself. The study shows that girls have on the whole greater achievement motivation and high academic achievement than boys. The relationship between academic achievement and achievement motivation is positive and significant, but achievement motivation explain only a small portion of the variation in the academic achievement of 9th class students, only 19% in case of boys and only 14% in case of girls.
Bala (1990) conducted a study on the relation between study habits and academic achievement. It was found in his investigation that there is a positive relation between study habits and academic achievement. The girls had higher academic achievement as compared to boys in relation to their study habits.

Giraudo (1990) studied the relationship between family environment, Teacher’s attitude, and school performance among 5-6-7th grade students and indicated that there exists a relationship between family environment, Teacher’s attitude variables, and a child’s academic achievement. Boys do not differ significantly from their girl counterparts on academic achievement. He concluded that there is a significant relationship between school climate and academic achievement. Good family environment has a positive impact on the academic achievement.

Sharma (2002) studied academic achievement of IX students of Chandigarh in mathematics in relation to intelligence and study habits. She concluded that intelligence affected the achievements of students in mathematics significantly at all the three levels—high average and low levels. Study habits affected the achievement of students in mathematics significantly at all the three categories—good, satisfactory, and poor category. The variable of intelligence had no significant relationship with variable of academic achievement at any level of significance.

Meenakshi (2003) studied the achievement at matriculation level and concluded that Non-government schools show a much better performance than government schools both in quantity and quality. Quantitatively, Non-government schools leave behind the government schools by a margin of 18% in matters of overall pass percentage. Qualitatively, 96% students included in the merit list are from Non-government schools. The share of government schools is of government schools is mere 4% which is indeed very shameful.

Devi (2003) conducted a study on the relationship between academic achievement of school students and their family environment. She concluded that
there exists insignificant relationship between dimensions of family environment & academic achievement of school students.

Ajawani and Rungta (2004) concluded that it is not necessary that all the under achievers are of less than average IQ or abilities. Sometimes a genius having greater IQ cannot make progress according to his abilities and academic efficiency and comes under the category of under achiever. It can be concluded that intelligence is not a variance in under and over achievement. The findings suggest searching for other variables than intelligence as the cause for under/over achievement in their subjects.

Ngailankim (2005) conducted a study on attitude and study habits related to achievement in mathematics of IX class students. The major findings of study were (1) no significant differences was found in the attitude towards mathematics of student grouped high average and low in mathematics achievement, (2) no significant differences was found in the study habits score of high average and low achievement in mathematics, (3) male and female students belonging to high average and low groups scored on mathematics achievements did not show significant differences in their attitude as well as study habits scores, (4) non tribal students showed higher attitude score as compared to the tribal students.

Bhaskaran and Sadatcharavel (2006) states that there exists a higher positive relationship between scientific attitude and achievement in science and Mathematics. There is a higher positive correlation between achievement in science and that of Mathematics.

Vamedevappa and Usha(2006) selected 200 students (100 boys and 100 girls) randomly for their study. It was found that there is a positive and significant relationship between parental involvement, good teaching and academic achievement among higher primary students. From this it may be concluded that good parental involvement and good teaching leads to higher academic achievement.
Kaur (2007) conducted a study on achievement motivation and academic achievement. She highlighted that students having high achievement motivation have high academic achievement than students with low achievement motivation.

EFA (2010) states that many schools are failing to meet their minimum standards for the quality of education millions of children, especially from socially marginalized groups are completing their primary education without having acquired basic literacy and numeracy skills. Equipping schools to provide good quality education will require governments to focus more strongly on recruiting and training teachers, making teachers competent, supplying textbooks and developing classroom practices that promote active learning. Support for literacy and reading in early grades has important role to play in the academic achievement of students, as these skills create the foundation for future learning.

Gordon (2013) in his article presents some findings of 11th year (roughly Fifth Form) average Mathematics students at a US Independent School in transforming the standard quadratic equation to represent fountain parabolic trajectories, which was the teacher's focus problem, along with some multiple-centre investigations they chose. A further set of opportunities with commentaries providing additional centres for student inquiry are included. Teachers of mathematics recognize the difficulty of reaching every student when the range of student abilities puts a considerable strain on the classroom discussion and time. In a response to the problem, students are grouped so that those with greater mathematical aptitude help those who have difficulties. While this approach is to be appreciated, it tends to mean that the more able students have less opportunity to explore further their own initiatives in mathematics, while those who have more difficulties find themselves on the receiving end with little opportunity to be in the role of enriching the mathematics experience for everyone, including themselves. A "multiple-centres" approach is designed to overcome these problems. In this variation of differentiated instruction, all students get the chance to engage the
material from a vantage point and at a level they find interesting and challenging as a consequence of their selecting extensions of the teacher's initial focus problem. This approach increases the Mathematical achievement of Students.

2.5 Conclusion of Review of Related Literature

After peeping into the literature available concerning different aspects of the study, the researcher has found that number of studies was conducted by different researchers on academic achievement in relation to intelligence, income, occupation reading habits, personality, self perception, sex, achievement motivation, school climate etc. Some of the researchers found that academic achievement is significantly related with intelligence, personality, study habits, occupation, income, school climate. And some of them found that there is no relationship between academic achievement and personality, school climate and sex. There were not many researches conducted on Teaching Aptitude, Teacher’s attitude towards Mathematics, Teaching Competency and Mathematical Achievement of students at elementary level in Punjab. But the investigator could not find any study conducted on status of teaching of Mathematics at elementary level in Punjab. So it was worthwhile to select the problem to study analytically the teaching of Mathematics at elementary level in Punjab.