Chapter - I
Introduction...
Achieving well-defined standards of learning by children in schools is a powerful success indicator of the system that works. Important concern for the primary stage is the need for comparability of standards between the formal and non-formal systems of education. Moreover, Indian parents more or less have two requirements from schools that their child comes home disciplined and be successful at examinations. Thus, schools and parents help students to think, analyze, develop a variety of skills and excel in their chosen areas which result in a more creative and curious child.

Parents play a very important role in molding their children’s character, personality, career and advancement in education. Modern parents retain the vestiges of their traditional roles, but in many parts of the world they send children to nursery school, kindergarten, high school, and then to college, thus delegating to teachers some of their traditional responsibilities for the socialization and personality-development of their children. They may differentially devote their attention, time and effort to different domains such as the child’s social, religious activities, academics & athletics etc. a transitional phase of growth and development between childhood and adulthood.

Parental Involvement today is seen as an important indicator in a child's academic achievements. Family practices of involvement are as or more important than family background variables in determining whether and how students progress and succeed in school. The cultivation of strong family-school linkages is increasingly and widely viewed as an essential component of strategies to improve students’ educational outcomes. There is plentiful research that suggests that children learn more when parents are positively involved in their educational experiences (Bartel, 2010). Especially parental involvement during the early years in a child's life, e.g. during the primary school years, correlate well with student academic success. This
question brings to mind important concepts in the field of child developmental psychology, such as Jean Piaget's model of development, Vygotzky's zone of proximal development, etc.

Thus, the role of parents in the life of a child also cannot be clearly defined. Hence, it is necessary to give a separate definition of Parental Involvement in the child’s education.

1.1 PARENTAL INVOLVEMENT

Parental Involvement has been touched for years as a very important predictor of student achievement in schools. Parental Involvement is defined as having an awareness of and involvement in schoolwork, understanding of the interaction between parenting skills and student success in schooling, and a commitment to consistent communication with educators about student progress. Parental Involvement is important to the educational success of a young adolescent and yet generally declines when a child enters the middle grades (Epstein, 2005; Jackson and Andrews, 2004; Jackson and Davis, 2000; NMSA, 2003). The term "parents" refers to biological parents, adoptive and stepparents, and primary caregivers (e.g., grandmother, aunt, brother).

Parental Involvement may be defined as the degree to which the parents are committed to him or her role as a parent and in the fostering of the optimal child development (Maccoby and Martin, 1983).

Parental Involvement implies how the parent involves themselves in developing the personality of the child. Involvement reflects parent’s dedication and positive attention to the child learning process and is facilitator of both identification and internalization of social values (Grolnick and Ryan 1987; Ryan, 1992).

The common wisdom is that Parental Involvement and strong 'schools are inseparable that you cannot have one without the other. Indeed, research indicates a strong link between Parental Involvement and student achievement (Hester, 1989). Parental Involvement in child's education appears to be associated with a range of positive outcomes for elementary school children including fewer behavioral problems (Comer, 1994), lower drop outs and higher student achievement (Kolb, 1984; Muller; 1993; Reynolds 1992; Stevenson & Baker 1987). However, the definition of effective Parental Involvement is not the same for everyone.
Gronlik and Slowlaczeck (1994) defined it as an allocation of resources to the child's academic endeavours. In other words, it denotes the extent to which parents take a keen interest and participate actively in their child's education.

Parental Involvement refers to either (a) voluntary involvement in the school of (b) planned, goal oriented programs of the school family and community partnerships that are organized and implemented to engage all parents in their children's education. Parental Involvement has been linked with student outcomes including increased achievement test results, a decrease in dropout rate, improved attendance, improved student behaviour, higher grades, higher grade point average, greater commitment to school work, and improved attitude towards school. Parental Involvement, care support and monitoring are related to many perceptions and behaviours of children including:

- Higher career aspirations among adolescents (Farmer, 1985; Wilson, 1992).
- Positive school attitudes (Chubb and Fertman 1992; Trusty 1996).
- Internal locus of control (Baumrind, 1991; Trusty & Iampel, 1997).
- Self esteem (Chubb and Fertman, 1992).
- Academic success (Paulson 1994; Darling and Steniberg, 1993).
- Adaptive school behaviour (Trusty, 1996).

Successful Parental Involvement sponsor their child's academic achievement by

- Establishing and enforcing particular rules for 'appropriate' behaviour inside and outside the home.
- Maintaining regular verbal interaction with the child around school issues, personal behaviour, plans for the future.
- Engaging the child in recreational activities with parents both inside and outside the home, conveying warmth.
- Maintaining contacts with the school. (Baker and Stevenson, 1987; Clark 1983; Henderson 1987)
Davies (1991) has defined Parental Involvement from a shifting perspective. The society restructures itself, as community restructures themselves and as schools restructure. Parental Involvement also is being transformed.

1.1.1 Components of Parental Involvement

Parental Involvement has two independent components:

- Parents and supporters
- Parents as active partners

These two components are independent yet focusing on one of these components alone is not a sufficient approach to Parental Involvement. Parents can be both yet not supportive of the education process. They also can be supportive but not active at the school, of course, the ideal is the parent who is both supportive and active but this often is difficult when both parents work outside the home, or when there is only one parent in the home.

Whether it is both and/or an active role, Parental Involvement can mean very different things, depending on one's perspective. Teachers may want Parental Involvement in the form of helping children with homework. Parents may see parental Involvement as making major decisions in the school. The truth to that Parental Involvement takes many forms right from reading to preschool children, getting children ready for school, volunteering at the school, serving one collaborative decision making committees, supervising to their homework, actively participating in parents teachers meet, to many more examples. (Malhotra, 2006)

1.1.2 Possible patterns of Parental Involvement

There is evidence of at least four related patterns of involvement (Darling and Steniberg, 1993).

- In the first pattern, parents become involved based upon communications they receive from their children’s teachers. In some cases, these communications prompt parents to become involved by raising their orientation to their children’s mastery of school material and attention to learning from mistakes.
- In the second pattern, parents become involved simply because their children’s grades are low.
• The *third* pattern of involvement is most common among parents with low educational attainment. In this pattern, parents are involved partly because of their interest in improving their children’s grades and normative performance.

• Finally, in the *fourth* pattern, parents with greater educational attainment perceive that they are more effective than other parents in helping their children, which encourages their home involvement.

Each of these patterns has some theoretical and empirical support based on this study, but much work is needed to identify other factors that could improve substantive meaning and statistical fit of the model.

The research literature reveals that the most important aspects of parent’s involvement appear to be direct interaction with the child in educational (teaching) situations and the ability to respond in expansive verbal ways to child behavior. Most educators have considered parent’s involvement in school activities and in the student’s schoolwork as an integral part to successful student academic performance.

1.1.3 Factors that arouse Parental Involvement

Many research studies conducted around this variable suggest that several factors encourage Parental Involvement, such as:

• The amount and quality of teacher communications (*Epstein, 1986*) and parent efficacy in involvement (*Epstein, 1990*).

• Child achievement is now recognized as a key factor that can encourage Parental Involvement. Many researchers have described the relationship between child achievement and Parental Involvement as bi-directional and dependent upon the action of each variable (*Seginer 1983; Zimmerman, 1998*).

• *Epstein (1990)* investigated the school home connections, teacher practices and Parental Involvement across the school years. They asserted that restricting Parental Involvement research to specific achievement tests clearly falls short of representing the full impact of parent participation.

• Several Parental demographic factors also appear to play a part in parents involvement in their children’s learning for example, (*Baker and Stevenson, 1987*) found that minority parents, more than white parents, perceive
homework as a means of improving children’s education. This suggests that minority parents may be more likely to become involved in or to encourage their child’s homework completion. In addition, parents with less education have been less likely to help their child at home, although those parents may be more likely than other parents to understand the importance of such involvement.

- Researchers of Parental Involvement have also begun to look for factors that mediate the impact of teacher communications and demographic variables on Parental Involvement. In one recent study, parent’s perceptions of their influence on their children mediated the impact of teacher’s communications on Parental Involvement among parents with low educational attainment. Earlier work suggested that parental beliefs also could mediate the relationship between home and parent demographic variables with parental educational practices.

- Parents have a special role to play in helping their children’s education. The way in which parents spend time with their children at meals, play, and at other times during the day, will go a long way in developing skills, which prepare the children for school and positively contribute towards their scholastic achievement. The objects in the home, the amount of parental interest in learning and the amount of practice and encouragement the child is given in conversation and general learning have been found to be significant influences on language and cognitive development, development of interest in learning, attention span, and motivation of the child.

- Wilson, (1992) emphasized that a close and affectionate relationship of the child with caring adults, the importance of setting standards of behavior and the attitude of caring adults towards achievement in general and school progress in particular were some of the factors influencing educational success. Generally speaking, the greater the parent’s involvement with the schools and children’s school related tasks, the higher the school performance of their children (Stevenson and Baker, 1987). These findings are in accordance with the results of Head Start and other early childhood intervention programs. It is argued that the influence of the caring adult would
be more educationally effective if the adults cared as much about the child’s cognitive development as his emotional development.

It may be further argued that the function of the caring adult would be educationally most effective if he could teach the child how education itself would be most beneficial to the child in his later life and invoke child’s own inherent pride of excellence in work, rather than by the ‘spare the rod and spoil the child’ approach.

### 1.1.4 Levels of Parental Involvement

There are many different levels of Parental Involvement according to (Schickedanz, 1995).

These are: - authoritative parent  
- harsh parent  
- passive parent  

Authoritative parent is considered the best category of involvement

These students are - more competent  
- have higher self control and self reliance  
- more serious about school work.

Harsh parent is the one who becomes too disciplinary on their children

These students are - more pressured  
- have a lower self esteem.  
- less motivated

However they have the beginning of moral development, but parents have problem distinguishing when discipline goes too far.

Passive parents are those who rarely get involved in their child's life

These students are - considered neglected  
- developed a more antisocial behaviour  
- they usually perform poorly academically as well
1.1.5 Types of Parental Involvement

Fan and Chen (2001) found in their research, parenting styles, as a critical measure of Parent Involvement, have been linked to student performance. Authoritarian, permissive, and authoritative are three styles of parenting (Baumrind, 1991). Authoritative, identified as the preferred style, includes parental warmth, inductive discipline, nonpunitive punishment practices, consistency in child rearing, and a clear communication of interest in the day-to-day lives of children (Rosenau, 1998). According to Rosenau, the authoritative parenting style has a strong correlation with student behavior and classroom management. Van Voorhis (2003) examined the effects of involving parents in interactive homework assignments (family homework assignments rather than student-in-isolation homework assignments) using the Interactive Homework program, a spin-off of the Teachers Involving Parents in School (TIPS) program developed at Johns Hopkins University. TIPS offers parents guidelines for collaborating with their children on homework activities, as well as information about school curricula (Epstein, Simon, & Salinas, 1997). In the evaluation study, in comparison to students engaged in traditional homework assignments, students who participated in the TIPS Interactive Homework program received better scores on homework and on report cards, and parents were more involved with homework.

Based on the factors analytic study of involvement indices by Grodnick and Slowiaszek (1994), they put forth a multidimensional representation of Parental Involvement that focuses not on one specific activity, but on various dimensions. According to this conceptualization parents may show their involvement in the child's schooling in four different ways through:

- **Behavioural Involvement:** Parents may manifest their involvement through their behaviour i.e. their overt actions may serve as indices of their involvement. This would include engaging in activities such as going to the child's school, meeting their teachers, attending parent-teacher meetings.

- **Personal Involvement:** While parents' overt behaviour is one way in which parents may exhibit their involvement in the child's schooling, the child may also have more profound activities and experiences that his parents are providing as resources to him and are concerned about him. The effect of this
affective experience may be different. The affective experience and emotional climate at home is the personal involvement of parents in children's schooling. The parents' personal involvement includes the child's affective experience that the parents cares about school, and has enjoyed interactions with them about school: like academic and social life of the child. This would encompass activities such as knowing about the child's day to day activities; his whereabouts; friends; what he usually does at school; how well he gets along with others; how well he is doing in studies; how regular and apt he is in his school; how well he performs in examinations and the like.

- **Cognitive Stimulation:** Exposing the child to cognitively stimulating activities and materials represents a historically new role of parents in fostering children's cognitive development. Parental cognitive stimulation has been defined as efforts to focus the infants' attention to objects and events within the environment. These attempts can be physical or verbal in nature by directing the child's attention to specific objects and activities, parents try to stimulate the child's thought and expression in ways that may lead his/her academic learning.

- **Intellectual involvement:** Till now, the major concern was with the direct parental activity that could influence the child's academic growth. Parents may however be involved in a subtle way too, that may not be directly academic. For instance, parents may themselves engage in various types of cognitive activities such as reading newspapers, books, magazines or going to the library and the like. This form of intellectual involvement of parents may also be crucial for the child's scholastic development. Parents' cognitive behaviour may permit modeling to occur and children may tend to adopt similar attitudes and values towards intellectual activities as their parents have.

**Gordon (1971)** presented nine parental cognitive factors that laboratory and field research has shown to be correlated with the intellectual and behavioural development of children viz:

- Amount of academic guidance provided for the child
- Parents' cognitive style on reacting to the environment.
- Presence of planned cultural activities
• Amount of direct instructional time with the child
• Educational aspirations for the child.
• Use of external resources
• Intellectual climate in the home
• Verbal facilities of parents
• Frequency of verbal contact between parent and child

Taylor and Davis (1984) categorized Parental Involvement into three categories:
• Home focused activities and strategies are defined as parents learning the skills they need to help their children succeed.
• School focused activities and strategies are defined as improving the information flow between home and school and vice-versa.
• Partnership focused activities and strategies are opportunities to focus together on student achievement for all students.

Gord (1989) reviewed literature regarding Parental Involvement and found that children do best when their parents are enabled to play four types of Parental Involvement pertaining to four types of roles.
• Simply being good parent, supporting the emotional and nutritional needs of children as they grow.
• Communicating effectively with their child's teacher, to assist in overcoming any challenges, or to advise the teacher of challenges the child is facing outside the classroom.
• Supporting the child in the completion of homework or the selection of courses that will prepare the child for post-secondary programmes.
• Attending school events such as assemblies, plays, science fairs, parent teacher's interviews etc. Simply attending the school reinforces to the child that what the child does every day is important to that parent.

Kristena (1993) stated a key to children doing well in school is for parents to be involved in their education. She provides several potential types of involvement such as:
• Parents as teachers and guides: Parents are their children's first and most important teachers. As parents guide their children's behaviour, they teach and
Parents as learners: Parents can participate in educational programmes that help them discover and learn ways to create a supportive learning environment for their child.

School-home communication: This involves parents who attend and fully participate in parent-teacher conferences, respond to newsletters and other communications from school representatives.

Parents as volunteers: These are the parents who commit their time and energies in a wide array of school activities.

Parents involved in governance, decision-making and advocacy: This Parental Involvement can range from parent-teacher organization participation and school improvement team activity to holding office as a school board member.

Parents as community collaborators: These parents work to establish and maintain community business and maintain community business and organizational support programs for education.

Sanders and Simon (1997) recognized various roles that parents play with regard to their children's education for philosophical, behavioural and organizational changes. Five types of parental involvement have been identified:

Parents: Parents performs basic obligations for their child's education and social development by-attending regular activities.

Collaborators: Parents reinforce the school's efforts and help to solve problems with their child by assisting in various tasks.

Audience: Parents attend and appreciate school performance and productions - open houses, plays, exhibits, athletic events, etc.

Supporter: Parents provide a wide range of volunteer assistance to their own children's teacher, to the parent organization, and to the school as a whole by serving in various activities.

Advisors and co-decision makers: Parents provide input on school policy and programs through membership in adhoc or permanent governance bodies.

Joyce Epstein, a leading researcher in the field of Parental Involvement, identified and studied multiple measures of Parental Involvement in the middle grades (Epstein,
Epstein and her colleagues developed a framework of six types of parental involvement. Table 1.1. Showing Epstein's conceptual framework for Parental Involvement

<table>
<thead>
<tr>
<th>Type</th>
<th>Parenting</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>Parenting</td>
<td>Activities are designed to help families understand young adolescent development, acquire developmentally appropriate parenting skills, set home conditions to support learning at each grade level, and help schools obtain information about students.</td>
</tr>
<tr>
<td>Type 2</td>
<td>Communicating</td>
<td>Activities focus on keeping parents informed through such things as notices, memos, report cards, conferences about student work, and school functions.</td>
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<tr>
<td>Type 3</td>
<td>Volunteering</td>
<td>Activities incorporate strategies to improve volunteer recruiting, training, and scheduling.</td>
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<tr>
<td>Type 4</td>
<td>Learning at home</td>
<td>Activities allow coordination of schoolwork with work at home (e.g., goal setting, interactive homework).</td>
</tr>
<tr>
<td>Type 5</td>
<td>Decision making</td>
<td>Activities are designed to solicit the voice of parents in decisions about school policies and practices.</td>
</tr>
<tr>
<td>Type 6</td>
<td>Collaborating with the community</td>
<td>Activities acknowledge and bring together all community entities (e.g. with the community businesses, religious organizations) with a vested interest in the education of young adolescents.</td>
</tr>
</tbody>
</table>

Izzo (1999) recognized four forms of involvement while studying on 1205 US children from Kindergarten.

- Frequency of parent-teacher contact.
- Quality of parent-teacher interaction.
- Participation in educational activities at home.
- Participation in school activities.
According to progress report on National Education Goals (1999) parental involvement may be of two kinds. The first occur within home, and ideally includes behaviours such as the following:

- Setting high expectations.
- Monitoring home work.
- Limiting television viewing or outside work.
- Knowing a child's friends.
- Discussing school events with children.
- Valuing and talking about education.

The second kind of involvement is the physical presence of parents in the school. This may range from:

- Occasional attendance at a parent-teacher conference.
- Regular participation in school activities.
- On going participation in school activities (e.g. serving on committees.)

Ira (1990) conducted extensive research on parent education and recognized six different types of parental involvement.

- Audience or recipient of information.
- Adult learner of new skills.
- Teacher of one' s own child.
- Volunteer in the classroom.
- Paid semi-professional.
- Decision makes and policy advisor.

Dornbusch and Pitter (1998) identified seven types of Parental Involvement:

- Parents as communicator
- Parents as supporter of activities
- Parents as learner
- Parents as advocate
- Parents as decision maker
- Parents as volunteer/professional
Parents as home activities teacher is

Garden and Breivofel (1996) had identified six types of Parental Involvement in the schools.

- The traditional type of parent involvement type (the parents are audience or bystander-observer).
- Parents as decision makers.
- Parents begin as classroom volunteers.
- Parents as a paid paraprofessional or teacher's aide.
- Parents as learners.
- Parents as teachers of their own children at home.

Greenwood and Hickman (1991) as cited in Volk (1994) detained that five basic models characterize parents' roles. These models include:

- Parents as the audience
- Parents as para-professionals
- Parents as teachers of their own children
- Parents as learners
- Parent as decision makers

Young and Helvie (1999) have endorsed two broad categories of Parental Involvement.

- Direct support includes attending school-sponsored functions and participating in the child's educational plans and progress.
- Indirect support manifests itself through positive attitudes towards schooling, home-based support of the child, and valuing education. The parent-child-school-link should recognize both support angles.

Petit (1980) attempts to organize the various types of Parent's Involvement. Petit specifies three levels of increasing Parental Involvement.

- Monitoring
- Informing
- Participation

Fan and Chen (2001) examined multiple measures of parent involvement. Using the methodology of meta-analysis (analyzing multiple research studies), the
researchers identified three constructs of parent involvement:

• communication,
• supervision, and
• parental expectations and parenting style.

Communication refers to parents’ frequent and systematic discussions with their children about schoolwork. Supervision includes monitoring when students return home from school and what they do after school, overseeing time spent on homework and the extent to which children watch television. Parental expectations and parenting style were found to be the most critical of the three. These include the manner and extent to which parents communicate their academic aspirations to their children. (Fan and Chen, 2001) found that high expectations of parents and student perceptions of those expectations are associated with enhanced achievement.

1.1.6 Barriers to Parental Involvement

Many parents encounter obstacles to in their children’s education. Multiple barriers exist related to parent involvement in their children's education including school constraints (Leitch and Tangri, 1988), mistrust of schools (Edwards and Young, 1992); miscommunication between parents and schools, lack of knowledge about subjects that they are learning about in school (Brock and Beazlay, 1995; Finders and Lewis, 1994); and lack of understanding of how to be involved. These barriers have been articulated parents related to their involvement in general education.

National Education Service Survey (2002) revealed several barriers that prevent or deter parents from participating in their children's education.

• Cultural Barriers: Another possible barrier is cultural differences is how education is valued. In some cultures, parents may believe that their only school related responsibility is simply ensuring their children go to school. These parents often have two or three jobs simply to make ends meet. Helping with homework or participating in activities supplementing the academic curriculum may not be a priority. Families that own their business may accept their children to grow into that career, therefore grades, attendance and behaviour issues may not be addressed in the family. School counselors can
provide parents with valuable information and help parents to realize the importance of a comprehensive education.

- **Scheduling Barriers:** The realities of everyday life, such as work schedules, child care arrangements and home situations may prevent parents from actively participating in their child's education. School counselors should accretion the reason for the absence or lack of responsiveness and develop ways to address the issue precluding Parental Involvement.

- **Language Barriers:** The most common barrier to Parental Involvement involves the most basic issue of communication language. Parents for whom English is not the primary language often miss opportunities to learn about important educational program because they do not understand the information shared through written communication, such as newsletters or fliers. School counselors can provide documents in other languages and use translators when necessary to provide parents with information regarding the importance of their involvement.

- **Environmental Barriers:** School environment is also barrier to Parental Involvement. Whether the school's climate, warm inviting clean and secretaries are friendly and welcoming influences the parent's participation. So, school counselors can ensure parents have an encouraging visit each and every time they walk through the doors.

**Williams (2002)** surveyed parents of children aged 5-16 attending schools in England to establish degree of involvement in their children's education. He revealed the different types of barriers to involvement that parents perceive.

The barriers evident in interpersonal exchanges are relatively subtle compared to those created by the material circumstances experienced by some parent. **Britt (1998)** studied the differential Parental Involvement in a US home based pre-school education programme. He distinguished between low and high risk families. The latter had a low socio-economic status compounded by problems associated with drugs, alcohol, over crowding and debt. He found that low risk families would be highly involved no matter what level of additional family support was provided. High risk families on the other hand, would be highly involved only if the programmers
were able to provide additional support for the problems of living with which they were coping. There is an extensive empirical literature on parental experience of school involvement illustrating starkly the sorts of barriers met by working class parents in their exchanges with teachers, schools and school administrations (Reay, 1996; Crozier, 2001; Vincent and Martin, 2000; Tett, 2001, and Vincent, 2001). Vincent and Martin (2000) separate barriers into three categories namely.

- **Human nature factors**: Which include parent and teacher fear of failure, fear of criticism or fear of each other's differences.
- **Communication factors**: An inability to communicate a real need for parent support.
- **External factors**: Which include lack of time (on the part of both teachers and parents), personal problems, administrative policies, busy lifestyle.

According to Vincent and Martin, a major reason, for lack of involvement, in secondary schools is that children do not want their parent involved. Becher (2002) listed teacher attitude as a barrier to Parental Involvement. Factors such as: an increase in single parent families, working mothers, limited English proficiency, a lack of familiarity with American culture, financial barriers and limited parental educational opportunities create barriers to effective Parental Involvement (Mulhern, Rodriguez, Brown and Shanahan, 2004).

Epstein (2004) emphasized that we don't want parents to be the teachers of every subject in the school—that is the teacher's job. Parents still can be highly supportive in academic areas. Everybody's contribution to the student's learning makes for equal responsibility.

Examining each barrier to involvement makes possible the creation of new approaches that foster optimal participation on the part of mothers and fathers. For instance, negative contact with schools can contribute to an unfriendly climate that reduces the likelihood of Parental Involvement. If parents themselves had negative experiences in their own schooling, they may already have formed a negative view of schools. These parents can view their children's school as hostile territory. Parents who are not comfortable speaking English may have experienced discrimination and humiliation because of the language difference when they were students. The lack of bilingual staff in schools contributes to feelings of powerlessness on the part of non-
English speaking parents when attempting to advocate for or resolve problems for their children. Finding ways to make mothers and fathers feel more comfortable and being welcomed in the school would improve the communication between school and parents.

Parents in economically disadvantaged families can face particular difficulties when attempting to participate in their children's education. As an example, some parents, especially those with low-wage jobs, face losing their jobs if they take time off work to attend meetings and functions. In addition, parents who are not well educated themselves may find it difficult to help their children with homework. Helping low-literate adults improve their basic skills has a direct and measurable impact on children's education and on the quality of their lives. Furthermore, children of parents who need and participate in literacy programs improve their grades, test scores, and reading skills. They are also less likely to drop out of school.

1.1.7 Enhancing Parental Involvement

Research has shown that parents do want to get involved with their children; however they need a little direction as to how to go about doing it. It has been verified through many studies that training in these areas prove beneficial both for parents and school. There is ample information available about how to increase levels of Parental Involvement. Moreover, parents are the child's first teacher. They are an invaluable resource. However, as children enter school many parents begin to ask themselves how they can be positively involved in their children's education. Those who research school-community partnerships report that when schools welcome parents and show them how to improve their child's learning at home they are far more likely to not only increase their school's Parental Involvement but also the motivation of their students (Epstein, 1991).

- In fact, the U.S. Dept. of Education: Office of Educational Research and Improvement (1997) has written a book on the resources available for involving families in public education. In this document, the following strategies were outlined.
- Overcoming time and resources constraints.
- Provide information and training to parents and school staff
• Restructuring schools to support family involvement
• Bridging school family differences

These strategies when followed and used appropriately can and will lead to effective and positive Parental Involvement in all schools which will in turn lead to school success for all children.

William and Chavkin (1989) described seven essential elements of strong Parental Involvement programs:

• Written policies
• Administrative support
• Training
• Partnership approach
• Two-way communication
• Networking
• Evaluation

Petit (1980) attempt to organize enhancement according to three types of Parental Involvement enlisted by him. Petit specifies:

• At monitoring level school make parents aware of the school situations. This is done through informal conversations announcements regarding the school's activities and questionnaire.

• At informing level means keeping parents informed about the policies, procedures, aims and expectations that exist in the school, but particularly in the classroom. This is done through parent teacher conferences, home visits, class newsletters, bulletin boards, reporting, and phone callers and takes home packets

• Thirdly at participation level parents become actively involved in the classroom with teachers. Teachers solicit the assistance of parents in helping the school and classroom with instructional support. Parents might act as aides or volunteers in classrooms, helping with bulletin boards checking assignments, or making games and activities.

Donbusch and Ritter (1988) explored many different ways by which parents
can be involved in education, and many ways schools and others in the community can make involvement more likely.

**Bauch (1988)** holds that the degree of parental participation is a significant indicator of the quality of schooling which might take place through:

- The enhancement of parent governor roles
- Involvement in inspection processes
- Provision of annual reports and prospectus
- The requirement for home/school agreements
- Provision of increasing amount of information about the curriculum, school performance and other matters

**Mosteller and Moynihan (1993)** suggested many different ways in which parents are involved in the education of their children ranging from active participation in formal bodies such as the school board and the PTA, to less formal involvement in school events, to coming along to watch a school concert or sporting event, to activities that parents conduct in the home in support of learning. The following table summarizes these different types of involvement.

**Berla and Henders (1989)** included the following strategies of evolving parents, which are based on the common sense approach, which according researcher works the best:

- Develop a policy for Parental Involvement
- Make sure that at least one person in the building knows every child well
- Maintain a friendly school office
- Encourage parent to parent communication
- Hire a full time parent contact person
- Have a parent room in the school building
- Determine and meet family needs for services
- Provide translation services when appropriate

**Fredericks and Rasknki (1990)** have identified fourteen ways to involve parents, they are:

- Flood them with information
- Make it a school wide effort
• Recognize students and parents
• Involve students in recruiting parents
• Conduct participatory projects that include the entire family
• Recruit community members
• Make the classrooms and the school a comfortable place.
• Use the telephone as an instrument of good news
• Find out why parents are not involved
• Have a variety of event scheduling plans
• Operate a parent hotline
• Use community members to endorse the program
• Videotape programs for parents
• Provide support services like babysitting

**Johnson (1991)** emphasized that when attempting to strengthen a Parental Involvement program, it should also make effort to get low income parents involved. Here are some suggestions laid by him:

• Have regular meetings to discuss homework, behaviour and curriculum.
• Conduct special parenting skill seminars.
• Help parents reinforce reading and math skills in children.
• Teaching parents how to help kids with home study.
• Encourage parent volunteerism
• Encourage parents to become educated themselves
• Make opportunities for students and parents to learn together
• Offer community education classes to get parents to come to the school

**Jackson and Cooper (1992)** have identified 10 factors that see successful urban programs when examining New York City high school projects:

• Leadership
• Accessibility
• Time
• Cultural awareness
• Active teacher roles
• Continuity
• Public recognition
• Broad based support
• Adolescent focus
• Recognition of parents as people

Raffaele and Knoff (2001) claim the work on home-school collaboration should build on a foundation of core beliefs they see as follows:

• Collaboration should be pro-active rather than reactive; the engagement of all parents should be worked for.
• Collaboration involves sensitivity to the wide ranging circumstances of all students and families.
• Collaboration recognizes and values contributions parents have to make to the education process.
• Collaboration must engender parental empowerment; all parents must be given a voice and that voice must be heard.

At the core of good enhancement practice is a commitment to communication. Key features of working with parents as set out in improving city schools (Ofsted, 2005) are:

• Accessible literature covering all parents want to know
• Frequent communication
• Consultations which are timely, flexible and planned to maximise attendance.

Emery (1999), stressed that in order for parental involvement to do well it must cooperate with programs provided by the school and community. This article describes following programs:

• Schools can communicate with families about school programs and student progress and needs.
• Schools can work to improve recruitment, running schedules to involve families as volunteers in school activities.
• Schools can encourage families to be involved in creative activities at home.
• Schools can include parents as participants in important schools decisions.
• Schools can co-ordinate with business and agencies to provided resources and services for families, students, and community.

Dyson and Robinson (2006) suggested the following model of effective Parental Involvement. The model attempts to show the factors in Parental Involvement in schooling that meets two criteria. First, these factors are known to make a positive difference to school outcomes. Second they are, in principle at least modifiable by educational process i.e. by the process of learning and teaching.

1.1.8 Outcomes of Parental Involvement

• Parent involvement leads to improved educational performance (Epstein et al., 2002; Fan & Chen, 2001; NMSA, 2003; Van Voorhis, 2003).
• Parent involvement fosters better student classroom behavior (Fan & Chen, 2001; NMSA, 2003).
• Parents who participate in decision making experience greater feelings of ownership and are more committed to supporting the school's mission (Jackson & Davis, 2000).
• Parent Involvement increases support of schools (NMSA, 2003).
• Parent Involvement improves school attendance (Epstein et al., 2002).
• Parent Involvement creates a better understanding of roles and relationships between and among the parent-student-school triad (Epstein et al., 2002).
• Parent Involvement improves student emotional well-being (Epstein, 2005).
• Types of Parent Involvement and quality of parent involvement affect results for students, parents, and teachers (Epstein, 1995).

1.1.9 Various recommendations for increasing Parental Involvement

• Conduct a needs assessment identifying what the concerns and issues are surrounding Parental Involvement in the education of their children.
• Develop, in collaboration with parents, shared goals and missions concerning young adolescents' learning and development (Ruebel, 2001),
• Develop a long-range parent involvement plan. "Parental Involvement may be implemented as a stand-alone program or as a component in comprehensive
school-based programs* (Comprehensive School Reform Quality Center, 2005).

- Engage in parent professional development (Comprehensive School Reform Quality Center, 2005; Marzano, 2003). First, conduct a needs assessment to identify focus areas for parent professional development. Use this needs assessment to guide the development of a balanced, comprehensive program of partnership. For example, parent professional development might include one- to two-hour free, weekly sessions held at night, or as a series of mini courses. The professional development could discuss specific parent behaviors and be used as a vehicle to involve parents in other aspects of the school (Marzano, 2003).

- Identify a family-school liaison who actively works to engage parents (Comprehensive School Reform Quality Center, 2005).

- Create a resource inventory to identify strengths, skills, and cultural and contextual knowledge of both parents and faculty members.

- Develop a repertoire of strategies (e.g., interactive homework, student-led conferences) designed to increase Parent Involvement at school and at home.

- Establish and maintain respectful and productive relationships with families (Jackson & Andrews, 2004; McEwin & Smith, 2005) to support the interaction of ideas and experiences centered on the learning of young people" (Nesin & Brazee, 2005).

- Establish open and two-way lines of communication (Comprehensive School Reform Quality Center, 2005; Epstein et al., 2002; Jackson & Andrews, 2004; NMSA, 2003) for thoughtful and reflective conversation.

- Use a variety of meeting spaces (NMSA, 2003) for equitable access and non-threatening environments.

Parents Involvement is a vital ingredient in a child's education which is gaining much importance. Parents, teachers, students, school officials, educationists all endure this concept which is multidimensional. Schools are under constant pressure due to decreasing resources, increasing needs and demands of children. Parents are the most important resource to schools if used wisely. So, a more active
view of parents is inherent in the present notion of Parental Involvement, with parents assuming a critical role in the educational process. The present investigation has been focused around the home based remediation i.e. the academic guidance provided to the child at home through parents, personal involvement, cognitive stimulation, intellectual involvement and behavioral involvement have therefore been selected as indicators of Parental Involvement in the present investigation.

### 1.2 PERFORMANCE IN MATHEMATICS

#### 1.2.1 Concept and definition

Mathematics can be defined as a group of related sciences, including algebra, geometry, and calculus, concerned with the study of a number, quantity, shape, space and their interrelationships by using a specialized set of notations (Collins English Dictionary, 2009), the study of numbers, equations, functions, and geometric shapes and their relationships (Cultural Dictionary, 2005), the study of the measurement, relationships and properties of quantities and sets, using numbers and symbols (Science Dictionary, 2002), mathematical sciences collectively, including geometry, astronomy, optics, science of structure, order and relation, that has evolved from counting, measuring and describing the shapes of object, it deals with logical reasoning and quantitative calculations (World origin & History Dictionary, 2010)

#### 1.2.2 The nature of Mathematics

One of the oldest of all fields of study is that now known as mathematics. Often referred, used, praised, and disparaged, it has long been one of the most central components of human thought. Mathematics relies on both logic and creativity, and it is pursued both for a variety of practical purposes and for its intrinsic interest. For some people, and not only professional mathematicians, the essence of mathematics lies in its beauty and its intellectual challenge. For others, including many scientists and engineers, the chief value of mathematics is how it applies to their own work. Because mathematics plays such a central role in modern culture, some basic understanding of the nature of mathematics is requisite for scientific literacy. To achieve this, students need to perceive mathematics as part of the scientific endeavor, comprehend the nature of mathematical thinking, and become familiar with key mathematical ideas and skills. That is why, mathematics, after its sheep-counting inception, has been studied primarily not for its utility but for its own intrinsic worth.
1.2.3 Patterns and relationships in Mathematics

Mathematics is the science of patterns and relationships or we can say in many ways, mathematics is like an art. As a theoretical discipline, mathematics explores the possible relationships among abstractions without concern for whether those abstractions have counterparts in the real world. The abstractions can be anything from strings of numbers to geometric figures to sets of equations. It is sense of beauty that many people have perceived in mathematics lies not in finding the greatest elaborateness or complexity but on the contrary, in finding the greatest economy and simplicity of representation and proof. As mathematics has progressed, more and more relationships have been found between parts of it that have been developed separately. These cross-connections enable insights to be developed into the various parts; together, they strengthen belief in the correctness and underlying unity of the whole structure.

Mathematics is also an applied science. Many mathematicians focus their attention on solving problems that originate in the world of experience. They too search for patterns and relationships, and in the process they use techniques that are similar to those used in doing purely theoretical mathematics.

1.2.4 Mathematics in Science and Technology

Because of its abstractness, mathematics is universal in a sense that other fields of human thought are not. It finds useful applications in business, industry, music, historical scholarship, politics, sports, medicine, agriculture, engineering, and the social and natural sciences. The relationship between mathematics and the other fields of basic and applied science is especially strong. This is so for several reasons, including the following:

- The alliance between science and mathematics has a long history, dating back many centuries. Science provides mathematics with interesting problems to investigate, and mathematics provides science with powerful tools to use in analyzing data. Often, abstract patterns that have been studied for their own sake by mathematicians have turned out much later to be very useful in science. Science and mathematics are both trying to discover general patterns and relationships, and in this sense they are part of the same endeavor.

- Mathematics is the chief language of science. The symbolic language of mathematics has turned out to be extremely valuable for expressing scientific
Mathematics provides the grammar of science—the rules for analyzing scientific ideas and data rigorously.

- Mathematics and science have many features in common. These include a belief in understandable order; an interplay of imagination and rigorous logic; ideals of honesty and openness; the critical importance of peer criticism; the value placed on being the first to make a key discovery; being international in scope; and even, with the development of powerful electronic computers, being able to use technology to open up new fields of investigation.

- Mathematics and technology have also developed a fruitful relationship with each other. The mathematics of connections and logical chains, for example, has contributed greatly to the design of computer hardware and programming techniques. Mathematics also contributes more generally to engineering, as in describing complex systems whose behavior can then be simulated by computer. In those simulations, design features and operating conditions can be varied as a means of finding optimum designs. For its part, computer technology has opened up whole new areas in mathematics, even in the very nature of proof, and it also continues to help solve previously daunting problems.

Mathematics, rather than being a science in its own right, is the foundation of all other sciences. Mathematics itself does not rely on the natural world for its information but on constructs of the human mind instead. (Although much of math was inspired by nature, it is still artificial.) Unlike science, there is no true knowledge to be gained from mathematics when the postulates were set, that determined what theorems would be true, false, or unprovable within that system. All that has ever remained is a process of identification. Also unlike science, mathematical knowledge is absolute. Mathematicians have no need of hypotheses, for the postulates tell that something is either right or wrong.

Mathematics is the queen of science and the language of nature. Its importance should be clear to any reasonable person. It is easy however to diminish the value of certain areas of research because they’re currently thought as having little practical use. Evolutionary needs brought our mind to prefer knowledge that can be employed for the solution of specific problems in the real world, rather than deeply abstract ones. It is an understandable and even excusable fallacy that there are useful fields of
math and useless ones, based on the perception of their applied or theoretical nature. But it’s still a misconception. Each theorem and discovery is a little piece of a larger puzzle that we conveniently categorize into aptly labeled macro-areas. Discoveries and mathematical ideas that are perceived as “useful” today because they’re applicable to engineering. (Orton, 1987)

1.2.5 Importance of Mathematics in daily life

Mathematics is more than just the science of numbers taught by teachers in schools and either enjoyed or feared by many students. It plays a significant role in the lives of individuals and the world of society as a whole. Mathematics is an essential discipline recognized worldwide, and it needs to be augmented in education to equip students with skills necessary for achieving higher education, career aspirations, and for attaining personal fulfillment. Its significance to education is not limited to the following aspects.

- **Enhances problem solving and analysis skills.** The methods involved in problem solving develop use of reasoning, careful and reasonable argument, and decision making.

- **Applied in daily life.** Mathematics prepares children to face a variety of simple to multifaceted challenges every human being encounters on a daily basis. Irrespective of our status in life and however basic our skills are, we apply mathematics.

- **Base for all technologies.** Application of mathematical knowledge in every field of study and industry produces new discoveries and advancement of new disciplines. All innovations introduced worldwide, every product of technology that man gets pleasure from is a byproduct of Science and Math.

- **Career aspirations.** Every branch of Mathematics has distinct applications in different types of careers.

Since mathematics encompasses all aspects of human life, it is unquestionably important in education to help students and all people from all walks of life perform daily tasks efficiently. As, modern life style seems completely handicapped and at times, highly improbable, in the absence of mathematics.

1.2.6 Why Mathematical abilities matters?

The concept of mathematical abilities is not something that is frequently discussed. At the personal level, however, almost every mathematician and
Mathematical Abilities

When talking to a non-mathematician, mathematical abilities can be usefully compared to musical abilities: in their developed form they appear highly specific, but are in fact quintessentially human, and so are widely spread in the population at large—in all social and ethnic groups. Like music, mathematics is a personality-building activity, it shapes the way the learner thinks and sees the world. As with music, mathematics has a profound educational impact even where someone no longer uses their mathematical training in later life. Like music, success in mathematics depends on systematic, cumulative learning, and each new skill needs to be built on a solid foundation laid at earlier stages.
Fig: 1.2.F. Mathematical abilities: procedural knowledge

Though mathematics is often thought to be a “cold” subject, this is a profound misunderstanding. As with music, mathematics requires a high level of motivation and emotional involvement on the part of the learner. Understanding is of course vital; but it is also essential for the learner to experience real difficulties: boredom and lack of challenge present far greater dangers when seeking to nurture mathematical talent. A degree of challenge and frustration are crucial.

Everyone has the ability to learn mathematics, although some children learn and make connections more quickly than others. Everyone has some mathematical ability, but some children have potential far beyond what most people are prepared to believe. Mathematical abilities in a child are often dormant and remain unnoticed both by the child and his other teachers. This potential can be lost forever if it is not
discovered and supported at the appropriate time. It may even be undermined by inappropriate experience: again, a comparison can be made with music, where a dissonant musical toy can seriously damage a child's perception of pitch.

Different mathematical traits appear at different ages. To develop a pupil's mathematical abilities effectively, one must tap into these abilities at appropriate times. A comparison can be made with language learning: almost every 7 year old child can master a foreign language with ease, though for an adult it could be an almost impossible task. Similarly, there are periods in a child's development when he or she is may respond to formal procedures and algorithms, and there times when they can be excited by the discovery of a new mathematical activity: generalization. Matching a talented child's mathematical experience to their cognitive development is a challenge for every teacher since every child will be different. (Borovik & Gardiner, 2006)

1.2.7 Minimum Levels of Learning (MLLs) in Mathematics

The primary mathematics should help children to develop understanding of key mathematical concepts of each level through appropriate experiences with things from the physical world and the immediate environment. It should help children to develop an understanding from the concrete to the abstract, from the specific to the general. The mathematics curriculum at the primary stage should therefore, be directed to achieve the following objectives (NCERT, 1991) i.e.

Ability to –

• perform computations with speed and accuracy
• translate verbal statements
  (a) In mathematical form using appropriate symbols, and
  (b) Diagrammatically
• make reasonably good approximation and estimate measurements
• apply mathematical concepts and skills to solve simple problem of day to day life
• think logically
• recognize order and pattern
Further, the five basic mathematical competencies skills were identified for this stage, which have been given below:

- understanding: (understand whole numbers and numerals)
- applying: (ability to add, subtract, multiply and divide whole numbers)
- solving: (ability to use and solve simple problems of daily life relating to units of money, length, weight, capacity, area and time)
- estimating: (ability to use fractions, decimals and percentages)
- recognizing: (understanding of geometrical shapes and spatial relationships)

The key mathematical competencies have been listed primarily to include for the most part concepts and application of skills which will help all children acquire certain minimum levels of functional mathematics. Mastery of these competencies will help children at present and in their later life to apply mathematical concepts and skills to solve problems relating to daily life. Therefore, these key mathematical competencies have included mental skills, estimation skills and the understanding of shapes and spatial relationships.

1.2.8 Linking Mathematics with life skills

Due to technological revolution, mathematics and mathematical thinking have become important for an individual to function effectively in day today private and social life. Accordingly, mathematical competencies as a goal of instruction and the way it is acquired through schooling has permeated in every national curriculum framework in the world. By mathematical competence as a goal of instruction means development of individuals who have acquired ability to explore, to conjecture, to reason, to communicate mathematically and becoming confident in one’s own ability. The curriculum should be permeated with these objectives and experience such that they become common place in the lives of students (NCTM, 1989). The traditional method of learning mathematics that promotes acquisition of passive and isolated bits of information and a variety of relations, rules and procedures etc. has to be shifted to include methods of investigations and notions of context.

Learning mathematics extends beyond learning concepts, procedures and their applications. It also includes developing a disposition towards mathematics and
seeing mathematics as a powerful way to looking at situations. Disposition refers not simply to attitudes but to a tendency to think and to act in positive ways. Student’s mathematical dispositions are manifested in the way they approach task whether with confidence, willingness to explore alternatives, perseverance and interest and in their tendency to reflect their own thinking (NCTM, 1989). This dispositional view of mathematics competence is valid for any student irrespective of caste, creed, sex, race, developed/developing countries all over the world. Thus, one has to gear up teaching/learning activities such that these goals are realized in the schools. Taking into account the above conception of what constitutes a mathematical disposition, meaningful and authentic context should play an important role in mathematics teaching and learning.

In other words, we require that school mathematics should become ‘mathematics for life’ rather than a collection of ‘decontextualised esoteric, abstract and useless knowledge’ (Volmink, 1994). To justify this view we make an attempt to link school mathematics with life skills so that the students see purpose in learning it and become confident to handle any situation that needs tangible solution. ‘Problem solving, decision making, communication, self-awareness, critical thinking, creative thinking, coping with stress and generative thinking.’ (National Curriculum Framework for School Education, 2000) are some of the core life skills students need to acquire in school.

1.2.9 Place of Mathematics in school curriculum

Mathematics is one of the oldest disciplines of human knowledge, with a continuous line of development spanning 5000 years of human civilization. It originated in the collective curiosity of man since the times immemorial and it attempts to provide a body of knowledge through procedures that are objective. In the era of Science and Technology mere acquisition of arithmetical skills is not sufficient. National Policy on Education (1986), has envisaged that “Mathematics should be visualized as a means of training to think, to reason, and to analyse logically. It should be treated as a concomitant to any subject involving analysis and synthesis.”

In modern education system no curriculum framework at the national or
Students as well as parents use and follow different methods and techniques to study mathematics. Research show Bloom’s Taxonomy plays an important part in achieving goals and aims of mathematics. In following paragraphs cognitive domain of old and new Bloom’s Taxonomy are being elaborated.

1.3 EDUCATIONAL OBJECTIVES: BLOOM’S TAXONOMIC CATEGORIES

1.3.1 Cognitive domain

The cognitive skills commonly referred to as intellectual ability and skills may also be described as including the behaviours like remembering, reasoning, problem solving, concept formation and to a limited extent, creative thinking. According to Bloom (1972) taxonomy of cognitive skills have six categories as discussed below:

- **Knowledge**

  Knowledge, as defined here, emphasizes most the psychological processes of remembering. The process of relating is also involved in that a knowledge test
situation requires the organization and recognition of a problem such that it will furnish the inappropriate signals and cues for the information and knowledge of the individual possess. For measurement purpose, the recall situation involves, little more than bringing to mind the appropriate material.

The term knowledge covers:

- **Knowledge of specifics**: This refers to the recall of specific and isolable bits of information. The emphasis is on symbols with concrete referents.
- **Knowledge of terminology**: Knowledge of the referents for specific symbols (verbal and non-verbal).
- **Knowledge of specific facts**: Knowledge of dates, persons, places, etc.
- **Knowledge of ways and means of dealing with specifics**: Knowledge of the ways of organising, studying, judging and criticising.
- **Knowledge of conventions**: It includes behaviours of knowledge of characteristics way of treating and presenting ideas and phenomenon: conventional symbols, dictionaries, rules, styles & practices.
- **Knowledge of trend and sequences**: It includes behaviour like knowledge of processes, directions and movements of phenomena with respect to time.
- **Knowledge of criteria**: It indicates the knowledge of the criteria by which facts, principles, opinions and conduct as tested or judged.
- **Knowledge of methodology**: This subcategory includes behaviours related with the knowledge of methods of inquiry and techniques.
- **Knowledge of the universals and abstractions in a field**: Knowledge of the major schemes and patterns by which phenomena and ideas are organized.
- **Knowledge of principles and generalizations**: This sub category includes behaviours regarding knowledge of particular abstractions which summarize observations of phenomena.
- **Knowledge of theories and structures**: Knowledge of systematic view of a complex phenomena, problem or field.
- **Cognitive operations used at knowledge level**: recalling, recognising, acquiring and defining.
Comprehension

'Comprehension' includes those objectives, behaviours or responses, which represent an understanding of the literal message contained in a communication. In reaching such understanding the student may change the communication in his mind. It covers:

- Translation
- Interpretation
- Extrapolation

Application

The use of abstractions in particular and concrete situations. The abstractions may be the form of general ideas, rules of procedures, or generalized methods. The abstractions may also be technical principles, ideas, and theories which must be remembered and applied.

- Cognitive operations used in this category include: applying, employing, relating, predicting, choosing, organizing, structuring and classifying.

Analysis

The ability to breakdown of a communication into its constituent elements or parts such that the relative hierarchy of ideas is made clear and/or the relations between the ideas expressed are made explicit.

- Analysis of elements
- Analysis of relationships
- Analysis of organisational principles
- Cognitive operations are used at this level,

Synthesis

The putting together of elements and parts so as to form a whole. This involves the process of working with pieces, parts, elements, etc., and arranging and combining them in such a way as to constitute a pattern or structure not clear before. It includes:

- Production of a unique communication
- Production of a plan, or proposed set of operations
• Derivation of a set of abstract relations
• cognitive operations used at this level are: writing, telling, relating, producing, transmitting, organising, modifying, documenting, designing specifying, deriving, developing, synthesizing and formulating.

➢ Evaluation

Ability of judgements about the value of material and methods for given purposes. Qualitative and quantitative judgements about the extent to which material and methods satisfy criteria, use of a standard of appraisal. It includes:

• Judgement in terms of internal evidence
• Judgements in terms of external criteria

1.3.2 Blooms’ new Taxonomy

Developing higher-order thinking skills in students is not an easy task. Historically, teachers have looked to Bloom's Taxonomy (1956) for assistance. Bloom's model divided thinking skills into lower-order and higher-order knowledge. The early taxonomy began with knowledge, understanding, and application as lower level skills and cast higher level skills as analysis, synthesis, and evaluation.

1.3.3 The critical appraisal of the Taxonomy

In the application of the original taxonomy, several weaknesses and practical limitations have been revealed, a notable weakness is the assumption that cognitive processes are ordered on a single dimension of simple-to-complex behavior (Furst, 1994), as required in a cumulative hierarchy, the categories were presumed not to overlap. (Anderson et al., 2001) suggest "cumulative hierarchy" which indicates that "mastery of a more complex category required prior mastery of all the less complex categories below it" is a "stringent standard." However, in applying the original taxonomy, (Ormell, 1974) reported contradictions in the frequent inversion of various objectives and tasks. For example, certain demands for Knowledge are more complex than certain demands for analysis or evaluation. Also, evaluation is not more complex than synthesis; synthesis involves evaluation (Krietzer et al., 1994). Recent decades gave rise to numerous criticisms, implying that the model was out of date. These criticisms included concerns with setting applicability, contemporary language, and process conceptualization.
Rationale for the revised Taxonomy

Revised taxonomy has to take into consideration the recent developments in the educational and psychological literature. At the time of the publication of the original taxonomy in 1956, behaviorist learning theories extensively influenced school curriculum and instruction. Since the publication of the original taxonomy in 1956, psychological and educational research has witnessed the introduction of several theories and approaches to learning which make students more knowledgeable of and responsible for their own learning, cognition, and thinking (e.g., Constructivism, Metacognition, Self-regulated, learning). All these theories and approaches see learning as "a proactive activity, requiring self-initiated motivational and behavioural processes as well as metacognitive ones" (Zimmerman, 1998). The revised taxonomy has to incorporate these new learner-centered learning paradigms into its structure. Constructivism, for example, assumes that students must discover, construct and transform knowledge if they are to make it their own. Self-regulated learning is the ability to use and develop knowledge, skills and attitudes acquired in one context in another context (Boekaerts, 1999). Self-regulated learners identify what task requires in terms of cognitive, motivational, and environmental strategies and determine if their personal resources are adequate to effectively accomplish the task (Ertmer and Newby, 1996) self-awareness, self-monitoring, and self-evaluation are crucial to effective self-regulated learning and performance (McCobs, 1989). Metacognition is central to self-regulated learning (Kriewaidt, 2001). Some researchers have suggested that self-regulated learning is synonymous with metacognition (Brown, Hedberg, & Harper, 1994).

In order to address the weaknesses in the original taxonomy and respond to the recent educational and psychological developments, a group of cognitive psychologists, curriculum and instructional researchers, and testing and assessment specialists revised the original taxonomy (Anderson et al., 2001). The revised taxonomy includes several significant changes with reference to assumptions, structure and terminology.

Revised Bloom’s Taxonomy (RBT) & changes in terminology

Changes in terminology between the two versions are perhaps the most obvious differences and can also cause the most confusion. Basically, Bloom’s six major categories were changed from noun to verb forms. Additionally, the lowest level of the original, knowledge was renamed and became remembering. Finally, comprehension and synthesis were re-titled to understanding and creating. In an effort
to minimize the confusion, comparison images appear below.

Fig: 1.3.F. New version of Bloom's Taxonomy

Fig: 1.4.F. Revised explanation of Bloom's Taxonomy
The new terms are defined as:

- **Remembering**: Retrieving, recognizing, and recalling relevant knowledge from long-term memory.
- **Understanding**: Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.
- **Applying**: Carrying out or using a procedure through executing, or implementing.
- **Analyzing**: Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing.
- **Evaluating**: Making judgments based on criteria and standards through checking and critiquing.
- **Creating**: Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing.

*(Anderson & Krathwohl, 2000)*

### Structural changes

Structural changes seem dramatic at first, yet are quite logical when closely examined. Bloom's original cognitive taxonomy was a one-dimensional form. With the addition of products, the Revised Bloom's Taxonomy takes the form of a two-dimensional table. One of the dimensions identifies The Knowledge Dimension (or the kind of knowledge to be learned) while the second identifies The Cognitive Process Dimension (or the process used to learn). As represented on the grid below, the intersection of the knowledge and cognitive process categories form twenty-four separate cells as represented on the "Taxonomy Table" below.
Table 1.2. Showing structure of the knowledge dimension in the revised taxonomy

<table>
<thead>
<tr>
<th>A. Factual Knowledge: The basic elements that students must know to be acquainted with a discipline or solve problems in it.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aa. Knowledge of terminology</td>
</tr>
<tr>
<td>Bb. Knowledge of specific details and elements</td>
</tr>
<tr>
<td>B. Conceptual Knowledge: The interrelationships among the basic elements within a larger structure that enable them to function together.</td>
</tr>
<tr>
<td>Ba. Knowledge of classifications and categories</td>
</tr>
<tr>
<td>Bb. Knowledge of principles and generalizations</td>
</tr>
<tr>
<td>Be. Knowledge of theories, models, and structures</td>
</tr>
<tr>
<td>C. Procedural Knowledge: How to do something; methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.</td>
</tr>
<tr>
<td>Ca. Knowledge of subject-specific skills and algorithms</td>
</tr>
<tr>
<td>Cb. Knowledge of subject-specific techniques and methods</td>
</tr>
<tr>
<td>Ce. Knowledge of criteria for determining when to use appropriate procedures</td>
</tr>
<tr>
<td>D. Metacognitive Knowledge: Knowledge of cognition in general as well as awareness and knowledge of one's own cognition.</td>
</tr>
<tr>
<td>Da. Strategic knowledge</td>
</tr>
<tr>
<td>Db. Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge</td>
</tr>
<tr>
<td>DC. Self-knowledge</td>
</tr>
</tbody>
</table>

The Knowledge Dimension on the left side is composed of four levels that are defined as Factual, Conceptual, Procedural, and Meta-Cognitive. The Cognitive Process Dimension across the top of the grid consists of six levels that are defined as Remember, Understand, Apply, Analyze, Evaluate, and Create. Each level of both dimensions of the table is subdivided.

Each of the four Knowledge Dimension levels is subdivided into either three or four categories (e.g. Factual is divided into Factual, Knowledge of Terminology, and Knowledge of Specific Details and Elements). The Cognitive Process Dimension levels are also subdivided with the number of sectors in each level ranging from a low of three to a high of eight categories. For example, Remember is subdivided into the three categories of Remember, Recognizing, and Recalling while the Understanding
level is divided into eight separate categories. The resulting grid, containing 19 subcategories is most helpful to teachers in both writing objectives and aligning standards with curricular. The "Why" and "How" sections of this chapter further discuss use of the Taxonomy table as well as provide specific examples of applications (Forehand, 2005).

**Table 1.3. Examples of cognitive domain of Bloom’s Taxonomy**

<table>
<thead>
<tr>
<th>Bloom’s Taxonomy</th>
<th>The Knowledge Dimension</th>
<th>The Cognitive Process Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Remember</td>
<td>Understand</td>
</tr>
<tr>
<td>Factual Knowledge</td>
<td>List</td>
<td>Summarize</td>
</tr>
<tr>
<td>Conceptual Knowledge</td>
<td>Describe</td>
<td>Interpret</td>
</tr>
<tr>
<td>Procedural Knowledge</td>
<td>Tabulate</td>
<td>Predict</td>
</tr>
<tr>
<td>Meta-Cognitive Knowledge</td>
<td>Appropriate Use</td>
<td>Execute</td>
</tr>
</tbody>
</table>

- **Changes in emphasis**

  Emphasis is the third and final category of changes. As noted earlier, Bloom himself recognized that the taxonomy was being "unexpectedly" used by countless groups never considered an audience for the original publication. The revised version of the taxonomy is intended for a much broader audience. Emphasis is placed upon its use as a "more authentic tool for curriculum planning, instructional delivery and assessment" (Oz-Teacher Net, 2001).

- **How the Taxonomy promotes active learning**

  (Clark, 2002) provided an adaptation of Bloom's work to facilitate active learning. Although originally the tool was developed by a class of teachers for use in curriculum building in the high school level, the suggestions would work for college level classes as well. The inner ring contains the original levels of Bloom's taxonomy. The middle ring offers synonyms for the various academic processes that comprise that taxonomic level. The outer ring links process to product. For example, if we want to increase application skills, we might ask students to construct diagrams of the key
concepts involved in the content of the class. If we wish to improve evaluation skills, we might ask students to produce an editorial for the student newspaper in which they discuss the strengths and weaknesses of a particular side of a controversial issue. We have modernized the language of the original circle to reflect the latest version of Bloom's Taxonomy.

As history has shown, this well-known, widely applied scheme filled a void and provided educators with one of the first systematic classifications of the processes of thinking and learning. The cumulative hierarchical framework consisting of six categories each requiring achievement of the prior skill or ability before the next, more complex, one, remains easy to understand. Out of necessity, teachers must measure their students' ability. Accurately doing so requires a classification of levels of intellectual behavior important in learning. Bloom's Taxonomy provided the

Fig.1.5.F. New cognitive taxonomy circle

1.3.4 Why use new Bloom's Taxonomy?

43
measurement tool for thinking.

With the dramatic changes in society over the last five decades, the revised Bloom's Taxonomy provides an even more powerful tool to fit today's teachers' needs. The structure of the revised Taxonomy Table matrix "provides a clear, concise visual representation" (Krathwohl, 2002) of the alignment between standards and educational goals, objectives, products, and activities.

Today's teachers must make tough decisions about how to spend their classroom time. Clear alignment of educational objectives with local, state, and national standards is a necessity. Like pieces of a huge puzzle, everything must fit properly. The Revised Bloom's Taxonomy table clarifies the fit of each lesson plan's purpose, "essential question," goal or objective.

- **Importance of new Bloom's Taxonomy**

  A search of the World Wide Web will yield clear evidence that Bloom's Taxonomy has been applied to a variety of situations. Current results include a broad spectrum of applications represented by articles and websites describing everything from corrosion training to medical preparation. In almost all circumstances when an instructor desires to move a group of students through a learning process utilizing an organized framework, Bloom's Taxonomy can prove helpful. Moreover, revised taxonomy helps in:
  - Analyze the objectives of a unit or a syllabus
  - Help teachers not to confuse activities with objectives
  - Help teachers realize the relationship between assessment and teaching/learning activities
  - Examine curriculum alignment

Revised taxonomy includes specific verb and product linkage with each of the levels of the cognitive process dimension. However, due to its 19 subcategories and two-dimensional organization, there is more clarity and less confusion about the fit of a specific verb or product to a given level. Thus, the revised Taxonomy offers teachers an even more powerful tool to help design their lesson plans.

As touched upon earlier, through the years, Bloom's Taxonomy has given rise to educational concepts including terms such as high and low level thinking. It has
also been closely linked with multiple intelligences (Noble, 2004) problem solving skills, creative and critical thinking, and more recently, technology integration.

Implications for prospective teachers and teachers

The taxonomy table may provide a framework within which prospective teachers as well as teachers can model not only the way they teach but also the way they examine and analyze their teaching. They should learn that they can only judge the effectiveness of their teaching in terms of what students actually learn. Hence, the revised taxonomy moves prospective teachers away from a "best practice" approach to teaching (Byrd, 2002). Prospective teachers, as well as teachers, should collaboratively engage in meaningful dialogues about answers to such questions: "What is the student supposed to learn from his or her participation in this activity? What knowledge is to be acquired or constructed? What cognitive processes are to be employed?" Without answers to these questions, it is impossible to properly classify instructional activities in terms of the Taxonomy Table. This provides a good exercise in reflective practice (Amer, 2004).

1.4 REVIEW OF RELATED LITERATURE

Parental involvement has been a major concern in academic achievement of students. Particularly, when we talk of subject mathematics, which is a very important subject in school curriculum. Unlike many other areas there has been smaller number of researches conducted in the area of parental involvement and mathematical skill. Moreover, these mathematical skills are important in mathematics achievement, but less concern has been found at all levels i.e. school, teachers and parents.

However, an attempt has been made to review maximum available studies conducted in area of Parental Involvement in mathematics and cognitive domain of Bloom’s Taxonomy. The studies cited in this chapter are presented and discussed under the following headings:

- Research on Parental Involvement and Mathematical Achievement.
- Research on Bloom’s Taxonomy.

1.4.1 Research studies related with Parental Involvement

Woolgar (1986) in his study learning how to count us ir. used direct instruction
techniques in a structured parental involvement program targeted toward improvement of basic arithmetic skills in six students ages 7-8. Among reported results was a statistically significant posttest improvement on an addition placement test compared to a control group performance without parental involvement.

Pate (1992) in his study conducted an ethnographic investigation of selected cultural factors which contributed to the high achievement of three black male students from single parent homes situated in a low income federally funded housing project founded that the mothers of these high achieving black male children were themselves reared in large, intact families in which both parents were employed. The natal family theme and background was characterized by a high degree of parental involvement, structure and control, emotional support from family and significant others.

Luce (1993) examined the effects of the family math parental involvement program on mathematics achievement, anxiety towards mathematics, attitudes toward mathematics, self-esteem, children’s perceptions of parental involvement, and parental attitudes toward education. Findings of the study revealed that participation in the family math program resulted in improved attitudes toward mathematics, reduced anxiety towards mathematics; increased amounts of time parents spent helping their children with educational activities and improved student enjoyment of the time spent working with parents. Also study revealed that most students perceived their parents to enjoy and be willing to help them with mathematics-related activities.

Dharma (1994) examined the relationship between student characteristics, preschool experience, school resources, school process variables and fifth grade student academic achievement in Pennsylvania Elementary Public Schools. Results indicated that in Pennsylvania family background had a strong influence on student achievement both in reading and mathematics. Student achievement seems to be lower in low SES groups of schools as compared to student achievement in high SES groups of schools. School process characteristics indicated by parental involvement and maximization of learning time significantly predicted student performance in both subjects.

Cousins (1995) examined the direct and indirect effects of socioeconomic status, parental involvement, family structure, teacher expectation of student
performance, and the direct effect of motivation on a measure of students' mathematics achievement for third-grade African-American and White students. These explanatory variables were identified by the literature review as affecting mathematics achievement and overall academic achievement. Result showed that parental involvement had significant indirect effects for all three groups. However, for the pooled sample of African-American and White Third-Grade Students, three of the explanatory variables had significant direct effects.

Addington (1996) in his study effects of parental involvement on mathematics achievement at eighth, tenth, and twelfth grades found that parental involvement in students' academic lives is indeed a powerful influence on student mathematics achievement at eighth, tenth, and twelfth grade. Further, conscious efforts to improve parent/child communication concerning school related matters and increased efforts to communicate parental aspirations for their child's future educational attainment can act as a useful tool to help increase mathematics achievement at the secondary school level.

Joy & Judith (1996) in his study to determine the effects of direct parental involvement on students' mathematics achievement in grades three, four and five found that parental involvement does not make a difference with third and fifth grade students' mathematical achievement test scores. There was however, significance with the fourth grade students' mathematical achievement test scores.

Mendoza (1996) in his study developing and implementing a parental awareness program to increase parental involvement and enhance mathematics performance and attitude of at-risk seventh grade students, developed a practicum program and implemented to increase parental involvement, teach parents how to help their children, reverse parents' and students' negative attitudes toward mathematics, and enhance mathematics performance of at-risk seventh-grade students. Result showed positive correlation between parental involvement and achievement in mathematics.

Macy (1997) in his study impact of parental involvement and selected demographic variables on student achievement found that parents' ethnicity has an affect on the reading, writing and mathematics scores of elementary students, level of involvement of the parents influenced the reading score of elementary students.
Parents' gender has no effect on the reading, writing and mathematics scores of elementary students. Level of influence involvement of the parent has no on the writing and mathematics scores of elementary students. The reading scores of elementary students are not influenced by the combination of the variables parents' gender, ethnicity, and level of involvement. Parents' gender and level of involvement has a combination effect on both the writing and mathematics scores of elementary students. The writing and mathematics scores of elementary students are not influenced by the combination of the variables parents' gender and ethnicity, ethnicity and level of involvement, and gender, ethnicity and level of involvement.

**Stemm (1998)** in his study an examination of the characteristics associated with at risk African-American students experiencing success in high school mathematics found that the students enrolled in the college preparatory mathematics courses generally believed that success in mathematics was due in part to their interest in the subject, belief in mathematics ability, solving extra mathematics problems, meaningful parental involvement, and motivation to do well in mathematics. In addition, high teacher expectation was identified as an important factor. However, the students enrolled in the non-college preparatory mathematics courses attributed their lack of success in mathematics to negative experiences in mathematics, lack of self-confidence in their mathematics ability, and a home environment conducive for promoting academic success was also lacking.

**Bal & Jennifer (1999)** in his study increasing parent involvement to improve academic achievement in mathematics for fourth-through sixth-grade students in two Midwestern metropolitan schools. Result showed that a modest increase in parental involvement; a slight academic improvement in reading; and no improvement in math performance.

**Brown (1999)** in his study the relationship between the dimensions of self concept and the dimensions of parental involvement: racial/ethnic differences and the impact on academic achievement found that increased self-concept is associated with higher parental involvement; exploring both the dimensions of self-concept and the dimensions of parental involvement provides more information about the differences in academic achievement than can be explained by any one variable alone; the impact of some of the dimensions of parental involvement on academic
achievement changes over time; and there are some racial/ethnic differences in the impact of the dimensions of self-concept and the dimensions of parental involvement on academic achievement over time.

Collie & Janet (1999) in his study the effects of four selected constructs of opportunity to learn on mathematics achievement of grade 12 students in new providence, Bahamas determined if a single dimension of opportunity to learn could be identified using four selected components of teachers' characteristics, students' characteristics, schools' characteristics, and classrooms' characteristics; and to determine if each of the four components of opportunity to learn was related to mathematics achievement. Result showed that each of the four components of school, student, teacher, and classroom were significantly related to mathematics achievement. However, when taken individually, manipulative use, parental involvement, and years of teaching experience were not significantly related to mathematics achievement.

Ma (1999) in his study examined the effects of individual characteristics and types of parental involvement on participation in advanced mathematics from grades 8-12. Result showed that mathematics participants had higher socioeconomic status than dropouts at every grade level. Gender, attitude, and achievement affected mathematics participation. Different types of parental involvement had different effects on mathematics participation.

Patricia (1999) in his study the relationship among factors of school community and the academic performance of students found a significant correlation between each school's academic performance, and the percent of parents who reported attending a conference, open house and/or volunteering within the school. The data showed a positive correlation between the aggregate tested achievement of students and the percent of parents who reported that their children regularly studied at home. Further, study supports the supposition that the involvement of parents contributes positively to the educational success of children. The data presented indicates that, with the involvement of parents, schools have experienced positive gains in the Curriculum of the Home, parent's perception of the school, and student achievement.

Thurman (1999) in his study, improving the mathematics homework completion of middle school students through involvement of their parents in using a
homework telephone hotline system. Result was expected to demonstrate a significant difference between the assignment completion rates of students whose parents received specific information about how better to utilize the homework hotline system and personal encouragement to use it, as compared to groups whose parents received no encouragement and/or no information about how better to use the system. While some small differences were seen, these results were found to be statistically insignificant due to high variability within each treatment group as well as other possible factors. Results of the study, including how these data fit with the current literature, are discussed. New directions for future research are also explored.

Alexander (2000) in his study examined the separate and combined effects of parental involvement, family structure and parents' educational background on student academic performance and effects of the variables parental involvement (more involved, less involved), family structure (single parent, two parents, grandparent/guardian) and parents' educational attainment (less than high school, high school, some college/college graduate) on the academic performance of fourth grade students on the reading, writing and in mathematics. Result showed that fourth grade students whose parents were less involved in school activities performed better on the math section than did those students whose parents were highly involved in school activities. The combination of the variables parental involvement, family structure and parents' educational attainment has no influence on the academic performance of fourth grade students on the reading, writing and in math section.

Jones & White (2000) in his study family composition, parental involvement and young children's academic achievement examined whether first- to third-graders' language and mathematics achievement was affected by family context and type of school-related activities practiced by parents. Result showed that achievement was related to family size, number of adult care givers, and parents' educational level. Students with parents engaging in learning activities at home were more likely than others to obtain high language and mathematics achievement scores.

Penn (2000) in his study sought to investigate whether the variables teacher turnover and class size predicted the British Virgin Islands' public primary schools' academic performance levels based on their class five students' performance on the Primary Five Examination in English, Mathematics and Social Studies during school
years. Result showed that class size was the only variable that significantly correlated with the schools' performance in all three subjects. The principals' and class five teachers' joint opinion was that their schools are average to slightly above average in their collective level of effectiveness in school. The student analysis found that parents' educational status, parental involvement, and socioeconomic status significantly correlated with the students' performances in all subjects.

**Karabetian (2000)** in his study examined the relationship of family process factors as perceived by seventh- and eighth-grade students to mathematics achievement among middle school students of different ethnic, gender, and economic background in a large school district in southern California. Result showed that males and females did not score differently in mathematics score, but females scored higher on all family process factors. The lower economic group scored lower in mathematics score, parental expectations, parental involvement, parental support, and father's attitude scores.

**Komako (2001)** in his study support systems in the learning and teaching of mathematics investigated parental involvement and group work as support systems applicable in the learning and teaching of mathematics. The study determined an association between mathematics achievement and the availability of or lack of parental support. Result showed there is association between parental involvement and achievement in mathematics.

**Okpala & Smith (2001)** in his study parental involvement, instructional expenditure, family socioeconomic attributes and student achievement investigated the influence of parental involvement, on the mathematics achievement of fourth graders in a low-income North Carolina county. Result showed that instructional supplies expenditures per pupil and parental volunteer hours were not statistically significant in explaining test scores. Low income negatively related to students' academic performance in mathematics.

**Ozturk (2001)** in his study personal and social factors that influence advanced mathematics course-taking during high school explored the factors that influence public high school students' advanced math course-taking. The factors investigated were parental involvement, peers' educational aspirations, students' own educational aspirations, and math self-concept. These factors were further examined for students
in different settings as defined by school demographic variables of urbanicity, minority concentration, and poverty concentration. Results showed that parental involvement was much more important than peer influence for students' educational aspirations, and in turn, for their advanced level mathematics course-taking. Parental involvement had a larger effect for students in high-minority, high-poverty urban schools, who, on the average, had taken the smallest number of advanced mathematics courses, compared to students in other settings. Results from the study indicated that African-American students' math self-concepts were not affected by their previous math achievement, suggesting the lack of feedback about their mathematics performance. Further recommendations based on the findings included improving parental involvement for all students, especially for students in high-minority, high-poverty urban schools, and providing more feedback to African-American students about their level of performance in mathematics and its consequences in terms of advanced math course-taking.

Randle (2001) in his study the effects of parental involvement and selected demographic variables on student achievement at selected high schools, determined the extent that parental involvement, ethnicity and marital status of the parents influence the student achievement at selected high schools. More specifically, study was concerned with the extent to which the independent and combined effects of the variables parental involvement, ethnicity and marital status of the parents have on the academic performance of selected high school students on the reading, writing and mathematics. Result showed that parents' ethnicity had some influence on the reading, math and writing scores of high school students. Marital status of parents had some effect on the math scores of high school students. Level of parental involvement had no influence on the academic performance of high school students.

Mendoza (2003) in his study the developmental and implementation of a parental awareness program to increase parental involvement and enhance mathematics performance and attitude at risk high school students found that the all objectives like parental involvement and mathematical performance were substantially met. However, the percentages were lower than originally set.

Jiang (2003) in his study family environment and academic achievement in Nanjing secondary schools examined the effect of family environment, especially
family social capital on the student's educational performance in a changing China. Result showed that the family environment measures do influence students' performance in the subjects of Chinese and mathematics; high achievers were more likely to be female students from three-member intact families with family academic resources in their home. Finally, their parents were likely to display a positive attitude towards schooling, have higher educational expectations, do less monitoring of their children (it was negatively related to achievement), have less sharing of cultural activities with their children (it was negatively related to achievement), be part of a large and efficient help network, and have a high degree of intergeneration closure with community members. This study shows that parent support, have a significant influence on performance in Chinese and mathematics.

**Wu (2004)** in his study the educational aspirations and high school students' academic growth: a hierarchical linear growth model studied the effects of the factors associated with students, families and schools on high school students' mathematics growth. Results indicated that though students' perceptions of their parents' educational aspirations for them had no effect on students' subsequent mathematics achievement, students' previous achievement mildly affected how they perceived their parents' subsequent aspirations. A positive significant bi-directional influence, however, was found between the students' educational aspirations and their mathematics achievement across the years of the students' secondary education. Also, results from the present study revealed that various types of parental involvement influenced their children's mathematics achievement differently, which reaffirms that parental involvement is a multi-dimensional construct. Results from this study indicated that schools with more parental school involvement had higher mathematics scores after controlling for the school size and poverty level of the students and families based on free and reduced lunch measure.

**Bembenutty (2005)** in his study examined the predictive association between gender, ethnicity, and homework parental involvement, self-regulated learning processes, and motivational beliefs among 10th grade high school students. Result showed that motivational beliefs and use of self-regulated learning strategies are significant predictors of math standardized test scores beyond and above parental active and reactive homework involvement and the students' gender and ethnic differences. Students who engage in self-regulation are better able to perform on the
V Clemons (2005) in his study underachieving gifted students: a social cognitive model examined the relationships among students' self-perception, attitudes toward school, study and organizational skills, achievement motivation, attributional style, gender, parental involvement and style, parental income and parental level of education, and students' academic performance or achievement. Findings indicated that there were no meaningful gender differences on any of the indicator variables. Students' socioeconomic status was found to have the strongest relationship with academic achievement followed by achievement motivation, study and organizational skills, and parental involvement and responsiveness. Parenting involvement was significantly correlated with attitudes toward school, socioeconomic status, and self-perceptions. Results suggest that achievement motivation does not serve as a mediator between parental involvement and style and achievement, or between socioeconomic status and achievement.

Driessen, Smit & Sleegers (2005) in his study parental involvement and educational achievement collected data from the large-scale Dutch PRIMA (primary education) cohort study, covering information on more than 500 schools and 12,000 pupils in the last year of primary school and their parents. An important finding was that predominant schools with numerous minority pupils appear to provide a considerable amount of extra effort with respect to parental involvement, but that a direct effect of such involvement cannot be demonstrated.

Haghighat (2005) in his study school social capital and pupils’ academic performance used nationally representative sample of eighth graders in the United States. Result showed that with other things equal, "school ambiance" has a significant and positive effect on mathematics and reading test scores of pupils. "School outreach" shows a positive and significant effect on mathematics achievement as well, but not on the pupils' reading test scores. "Parental involvement" initiated mainly by the parents does not show a significant result.

Norman (2005) in his study parental involvement: an effective strategy for secondary alternative discipline schools’ student achievement and compulsory student attendance found that relationship between parental involvement and student mastery of English and mathematics in alternative secondary discipline schools, grades 6-12.
The results indicated that parental involvement had a positive correlation with student achievement in both core subjects as suggested in previous studies regarding parental involvement and student academic performance. Further, the relationship between parental involvement and student attendance in alternative secondary discipline schools, grades 6-12 showed that parental involvement had a positive correlation.

Gonzalez & Wolters (2006) in his study the relationship between perceived parenting practices, parental involvement and achievement motivation in mathematics. Algebra I students (N = 140) in a Southeast Texas public high school completed self-report surveys. Result showed that perceived authoritative parenting was positively related to both a mastery goal orientation and higher relative autonomy. Permissive parenting was negatively related to a mastery orientation and positively related to a performance approach orientation. Authoritarian parenting was positively related to a performance approach orientation only. Also, behavioral involvement was positively related to both a performance approach and performance avoidance goal orientation.

Machesky (2006) in his study impact of school size on graduation rates, drop-out rates, and academic achievement in Michigan high schools found factors like parental involvement and parent's academic attainment level affect school size and academic achievement as well as issues related to accuracy in graduation and drop-out rates.

Begum (2007) in his study effect of parent involvement on math and reading achievement of young children studied parenting practices in families of different income and ethnicities, and their impact on the math and reading achievement of young children across the school. The findings of this research indicate that family has a significant influence on the math and reading achievement of all children in kindergarten, first grade, third grade and fifth grade. Math and reading performance of the children in kindergarten, first grade, third grade and fifth grade have varied and related to the parent participation in home enrichment activities.

Kerr (2007) in his study parental influences on mathematics achievement of children of immigrant backgrounds compared the mathematical performance of children who have foreign born parents and English as a second language (ESL) to the performance of native English speaking children with Canadian born parents from
It was found that, on all numeracy measures, immigrant/ESL children performed as well or better than native English speaking children with Canadian born parents. This difference was more profound in grades 3 to 6, in which immigrant/ESL children performed higher on a number of numeracy measures compared to native English speaking children with Canadian born parents. In grades 2 to 6, East Asian students had the highest scores on numeracy measures compared to Europeans, Middle Eastern and Filipino students. Immigrant parents showed higher involvement in their children's mathematical learning (e.g., tutoring, aspiration for higher education and better grades for their children) when compared to Canadian born parents. These attitudes were reflected in the children's beliefs about mathematics and their performance.

Maher (2007) in his study home school partnership within mathematics intervention, examined parental involvement in their children's mathematics learning. Findings of a study that took place at a high socioeconomic status (SES) primary school in New Zealand with teachers and parents of Years 1 and 2 students. Partnership with parents in the teaching of reading was well-established but was less apparent in mathematics. Parental involvement was seen to be a dynamic force in the progress of those students who took part in a mathematics intervention program.

Pan (2007) in his study parental involvement with children's mathematics learning in American and Chinese families during the first grade and junior high school transition periods. Results showed that Chinese parents and children emphasized the child's responsibility or agency in mathematics learning whereas American parents and children placed more emphasis on responsibility of parents in children's mathematics learning. American and Chinese parents also differed in their emphasis on the specific types of parental involvement practices with children's mathematics learning. The cross-cultural differences in parental involvement practices were consistent with the parents' beliefs in these two countries regarding the most important type of parental involvement practices. American parents' involvement practices were consistent across the two grade levels whereas Chinese parents employed different involvement strategies at these grades. Although parents' involvement practices predicted children's motivation to learn mathematics and mathematics achievement for both cultural groups, effective parental involvement strategies were different for American and Chinese children. Study concluded that
parental beliefs of educational responsibility and involvement practices serve as the
guiding forces of parental involvement practices in both cultural contexts. Chinese
parents put more emphasis on child agency and employ a broader range of
involvement strategies than American parents.

Price (2007) in his study the relationship between self esteem, campus climate
and parental involvement on academic performance in African American boys. Result
showed that higher campus climate scores in middle school boys and lower scores for
high school boys. Self-esteem, campus climate, and parental involvement were related
more to achievement in middle school males than high school males. However,
campus climate and parental involvement were more related to achievement in high
school males than in middle school males.

Ricker (2007) in his study a child’s perception of parental involvement and
the effects on academic achievement in mathematics, science, social studies, and
language arts. Result showed relationship between the value the children perceive the
parents place on education and the value the children themselves place on education,
the relationship between the child's perception of parents helping the child with
homework in the elementary and middle school years and the amount of time the
child spends on homework in high school, and the relationship between the children's
perception of expectations the parents have for him/her and the expectations the
children place on themselves.

Sirvani (2007) in his study the effect of teacher communication with parents
on students’ mathematics achievement. The investigator selected four Algebra-I
classes taught by one teacher and randomly placed two classes in the control group
and two classes in the experimental group. The parents of the students in the treatment
group received monitoring sheets twice a week, that contained students' scores on
daily homework and test grades, but the parents in the control group did not receive
monitoring sheet. Students in the experimental group out performed the students in
the control group. With respect to gender, the results showed that parental
involvement did not affect student achievement differently. Lower achieving students,
in the experimental group significantly outperformed such students in the control
group.
Zhao (2007) in his study school expectations and initiatives for parental involvement in 30 nations found no significant relationship between national level of school expectations for parental involvement and national level of student academic achievement or attendance rate. Contrary to our expectation, the relationship between the national level of school expectation for direct parental involvement and national level of educational inequality was positively significant. In addition, national level of school initiatives in parental involvement was also positively associated with educational inequality. Comparison of six nations (United States, Canada, the Czech Republic, Hong Kong, Taiwan, and the Netherlands) revealed that different school characteristics were associated with high levels of expectations and initiatives for parental involvement in different nations. U.S. schools' expectations for parental involvement were more likely to be affected by schools' cultural factors, such as teacher collaboration and school disciplinary issues. In the U.S., students attended school more often in those schools that had higher levels of expectations for parental involvement. Students in the United States were more likely to achieve better if their schools had higher expectations for parents' direct involvement. However, in Czech and Taiwan, school expectations or initiatives were negatively related to student attendance rates or mathematics achievement.

Clemons (2008) in his study underachieving gifted students: a social cognitive model examined the relationships among students' self-perception, attitudes toward school, study and organizational skills, achievement motivation, attributional style, gender, parental involvement and style, parental income and parental level of education, and students' academic performance or achievement. Result showed that students' socioeconomic status was found to have the strongest relationship with academic achievement followed by achievement motivation, study and organizational skills, and parental involvement and responsiveness. Parenting involvement was significantly correlated with attitudes toward school, socioeconomic status, and self-perceptions. Result showed that achievement motivation does not serve as a mediator between parental involvement and style and achievement, or between socioeconomic status and achievement.

Menzo (2008) in his study parental involvement and achievement in mathematics: an analysis of a promising initiative explored the features of a program that focused on increasing parental involvement in their children's mathematics
education and investigated what specific qualities of teacher-to-parent and school-to-parent involvement accompany a program that successfully involved parents. Result showed that the instructional program actively engaged parents; enhanced parent and teacher relationships; increased the range of options for parents to communicate with teachers and enhanced the ease and comfort of their communication. Parents indicated that the program was relevant to their concerns, focused on helping them improve the academic achievement of their children, and provided a substantive amount of parent-teacher contact. The program quality and the knowledge parents gained about algebra empowered them to become more involved in their child's learning. In doing so it ultimately improved parent-child relationships as they related to mathematics and school in general. Participation in the program led to parents gaining confidence due to a better understanding on how mathematics should be taught to their children. Further, it indicates that much work must continue to occur to educate parents about new educational practices and also inform educators about their responsibility to connect with parents regarding curriculum and instruction. Schools and teachers need to provide access to such initiatives, parents, in turn, need to avail themselves to the opportunities offered. On the third level, students must not be forgotten in the planning and implementation of parental outreach initiatives.

O’Sullivan (2008) in his study the effect of parental involvement with mathematics homework on early elementary and junior high school students examined how parent assistance with mathematics homework varies according to student age and achievement level. Result indicated a relationship between frequency of mathematics homework assistance and parent efficacy, student grade level and student achievement level. Specifically, parents in the present study provided more homework assistance to younger students and to those with lower achievement, and parents tended to be more involved when they had high levels of self-efficacy. Study found that parents provide more autonomy support to elementary school students than they do to junior high school students. This study found that provision of structure, rather than autonomy support, is significantly associated with positive academic outcomes.

Jenkins & Renita (2009) in his study the relationship between parental involvement and student achievement among students in a variety of contexts and samples. Results showed that all three types of parental involvement scores were
positively related to achievement test scores in reading and English language arts (but not mathematics, science, or social studies), which may be due to the fact that parents of students in special education programs (unlike parents of general education students) view reading with their child as the easiest or best way to become involved in their child's education.

Joe & Davis (2009) in his study examined the relationship between parental influence and the school readiness and early academic achievement of African American boys. Result showed that there are differences in which academic beliefs and parenting behaviors are most effective in facilitating school readiness and early achievement. Emphasizing the importance of academic skills for African American boys was associated with higher reading and mathematics achievement as well as prior enrollment in center-based child care. Parenting behaviors, such as discussing science topics, reading books, and discussing family racial and ethnic heritage, differed in their significance in predicting cognitive outcomes.

Levpuscek, Puklek & Zupancic (2009) in his study math achievement in early adolescence: the role of parental involvement, teachers' behavior, and students' motivational beliefs about math. By the end of the first school term, 365 Slovene eighth graders reported on their parents' academic involvement (pressure, support, and help) and their math teachers' behavior in the classroom (support, academic press, and mastery goal). During the second term, the students filled-in the questionnaires on their motivational beliefs about math, and at the end of the school year, their final math grade was obtained from school records. Both of the social contexts significantly predicted students' outcomes. Students' perceptions of math teachers' behavior were predictive of both motivational beliefs and achievement in math, over and above the account of students' evaluations of their parents' involvement. Furthermore, parental academic pressure and support were directly (negatively) related to students' math grades.

Olatoye & Agbatogun (2009) in his study parental involvement as a correlate of pupils' achievement in mathematics and science investigated the achievement of pupils in the public and private primary schools in mathematics and science. The descriptive survey research design was employed to carry out this study. 480 pupils from thirty primary schools in Ogun State, Nigeria were randomly selected for this
study. Result showed that parental involvement is an important predictor of mathematics and science achievement. There exists a significant difference in the parental involvement of public and private primary school pupils. Private school pupils enjoy more parental involvement than their counterparts in the public schools.

Padavick (2009) in his study parental involvement with learning and increased student achievement and examined different types of parental involvement and its effects on student achievement. Results showed that more education and the higher socioeconomic status of the parents were related to academic success and that the upbringing of the student's parents and parental involvement, such as reading to their child at an early age or constant supervision when the child was working on homework, was also related to academic success. The study contributes to positive social change by providing evidence that active parental involvement in learning can translate into greater academic success of their children.

Phillipson (2009) in his study examined parents’ role in academic achievement and intellectual development of child. The participants were 215 primary 5 and 6 students from four primary schools in Hong Kong, and their parents. Students were administered a test of working memory and their academic achievement was indicated by their school-assessed mathematics and language achievement scores. Parents reported their expectations of their children's academic achievement, the extent of their home and school involvement, and their educational and income levels. Correlational and sequential regression analyses showed that different schools yielded different contexts of academic achievement. The results showed that parents, and especially parental expectations, play an important role in children's academic achievement.

Xia (2009) in his study family factors and student outcomes examined relative importance of family versus school factors in producing academic and nonacademic student outcomes, and whether and how their impacts vary across different student groups. Findings of this study suggest that family process factors can have significant impacts on both academic and nonacademic outcomes. Results of the U.S. data indicate that even after controlling for demographics and school inputs, student achievement was associated with multiple dimensions of family process factors including parental expectations and beliefs, learning structure, resources availability,
home affective environment, parenting and disciplinary practices, and parental involvement.

**Zhao & Akiba (2009)** in his study school expectations for and student mathematics achievement: a comparative study of middle schools in the US and South Korea, examined the level of school expectation for various types of parental involvement in the US and South Korea and the relationship among school characteristics, expectations for parental involvement, and 8th grade students’ mathematics achievement. Results showed that teacher collaboration and school disorder problems were two school factors associated with the level of school expectations for parental involvement in both countries. The study also found that school expectations for parental involvement were significantly associated with higher student achievement in mathematics in the US but not in South Korea.

**Fan & Williams (2010)** in his study the effects of parental involvement on students’ academic self efficacy engagement and intrinsic motivation of 10th-grade students'. The results showed that both parents' educational aspiration for their children and school-initiated contact with parents on benign school issues had strong positive effects on all five motivational outcomes. On the contrary, parent-school contact concerning students' school problems was negatively related to all five motivational outcomes investigated in the study. Additionally, parental advising positively predicted students' academic self-efficacy in English as well as intrinsic motivation towards English, and family rules for watching television were positively linked to students' engagement and intrinsic motivation towards both English and mathematics.

**Kaya & Lundeen (2010)** in his study capturing parents’ individual and institutional interest toward involvement in science education examined parents are generally less involved in their children's science education (as compared to reading and mathematics) due to low self-efficacy and a lack of home-school communication. Results showed largely positive family interactions and attitudes about science learning and increased parental interest toward involvement in elementary science and mathematics Parents frequently used productive questioning techniques during activities.
Marshall & Swan (2010) in his study parents as participating partners confirmed that parental involvement in education is positively associated with student achievement. Result showed that having parents' support is a useful way to overcome difficulties that occur when the content of mathematics lessons is different from that experienced by the parents in their own schooling.

Powell (2010) in his study the effect of parental involvement on mathematics achievement of African American middle school students and found that parental involvement and student perception of parental involvement have little or no influence on student achievement, which contradicts earlier findings of most researchers.

Strayhorn (2010) in his study the role of schools, families, and psychological variables on math achievement of black high school used data from the National Education Longitudinal Study. Result showed that locus of control, gender, parental involvement, teacher perceptions, and opportunity to learn play on Black students' math achievement.

Ho (2010) investigated the relationship between family factors and students' scientific literacy performance in Hong Kong. It was found that students' scientific literacy performance, which was measured by their science achievement and self-efficacy towards science, were significantly associated with certain types of parental investment and involvement even after controlling background factors of both students and schools. Parental investment in cultural resources and parental involvement in terms of organizing science learning enrichment activities at an early age were found to be significantly associated with students' scientific literacy performance.

Cho & Campbell (2011) in his study differential influences of family processes for scientifically talented individuals' academic achievement along developmental stages from grades 4 to 12 and science Olympians in Korea were examined by administering Korean Inventory of Parental Influence. Results showed that family processes were perceived more frequently or more strongly by scientifically talented students and younger students than general-education students and older students, respectively. Supportive and conducive family processes were maintained even in the high-school period in the families of scientifically talented
students, whereas they decreased as students in general education get older. Father's involvement emerged as the most influential predictor of mathematics and science achievement, whereas press for intellectual development was a significant predictor for grade-point average. Parents may need to maintain the conducive and supportive family processes even for their high-school children in order to nurture their talents in mathematics and science.

Park, Byun & Kim (2011) in his study parental involvement and students’ cognitive outcomes in Korea, focusing on private tutoring collected data from a longitudinal survey in Korea that has traced 7th-graders for two years were used to investigate the determinants and the effects of parents’ private tutoring-related activities in comparison to other types of home-based and school-based parental involvement. Result showed that parents' efforts in selecting and monitoring private tutoring are significantly associated with increased math and English test scores.

Review;

Parental involvement helps in academic achievement has been found in many research. (Woolgar, 1986; Pate, 1992 and Luce, 1993) found Parental Involvement enhanced academic achievement in mathematics. (Cousins, 1995; Mendoze, 1996; Joy and Judith, 1996) found a positive effect of Parental Involvement in Performance of mathematics in students of all grades. (Stemm, 1998) found Parental Involvement and motivation do well in mathematics. (Ma, 1999; Patricca, 1999) showed different types of Parental Involvement has significant effects on mathematics. (Komako, 2001; Kapala and Smith, 2001) found association between Parental Involvement and achievement in mathematics. (Jiang, 2003; Bembenutty, 2005; Joe and Davis, 2009 ; Cho and Campbell, 2011; Marshall and Swan, 2010) found that parent support have a significant influence on performance in mathematics. (Phillipson, 2009; Maher 2007) found Parental Involvement a dynamic force in the progress of the students.

Few studies showed that Parental Involvement has no effect or less effect on academic achievement of students. (Macy, 1997; Begum, 2007; Collie and Jannet, 1999; Bal and Jennifer, 1999; Munoz, 2000; Sirvani, 2007; Jenkins and Renita, 2009; Powell, 2010) found that Parental Involvement has no effect or less effect on academic achievement of students in mathematics and other school subjects.
1.4.2 Research studies related with Bloom’s Taxonomy

Congero (1981) in his study the relationship between cognitive style and three types of academic achievement found that style attributes do account for a significant proportion of the variance in achievement in elementary statistics.

Little (1981) in his study a taxonomic approach to measure achievement in mathematics for elementary teachers, evaluated the effectiveness of a geometry course for pre-service elementary teachers and, at the same time, to validate the assumptions that the arrangement of categories in Bloom’s Taxonomy is hierarchical and cumulative. Sixty-two pre-service elementary education majors took an investigator-constructed achievement test after completing the course, for which the Taxonomy was used to model behavioral objectives. Results showed that the hierarchical clustering scheme analysis of the correlations between the Knowledge, Comprehension, Application, and Analysis subtests of the examination supported the stated hierarchy for these four "Taxonomy" levels, but that data related to all six "Taxonomy" levels failed to support the stated hierarchy.

Covington, Helen & Tiballi (1982) in his study used Bloom’s Taxonomy for precision planning and creative teaching in the developmental math classroom. In first section he provided background and identified the six steps in the cognitive domain, arranged from the lowest to the most complex level of learning, as knowledge, comprehension, application, analysis, synthesis, and evaluation. Next, the advantages of applying the taxonomy to developmental math courses were outlined, in terms of its role in aiding students to overcome math anxiety and in providing a structure within which the instructor can articulate the behavioral objectives for the students. Then, the use of the taxonomy for lesson planning and creative teaching were discussed, using as an example a lesson involving quadratic equations. First, the formula was stated and the students are asked to memorize it. Second, the students relate the general formula to specific applications. Third, students were asked to solve problems using the equation. Fourth, students applied the skills learned to solving word problems and relating quadratic equations to other types of equations. Fifth, students were taught to synthesize the knowledge of quadratic equations attained and other algebraic techniques. Finally, methods of problem solving were evaluated on the basis of their validity, precision, and elegance.
Moore (1982) in his study Bloom’s Taxonomy of educational objectives, cognitive domain studied the hierarchical structure of the cognitive domain presented taxonomy of educational objectives does not reflect the actual nature of the learning process. Attempts to apply the classification levels to student learning in mathematics and other subjects place the taxonomy’s usefulness in question.

Ekstrand (1983) in his study methods of validating learning hierarchies with applications to mathematics learning made test items which were constructed following a cumulative hierarchical structure based on the first four categories in Bloom's Taxonomy of educational objectives for the cognitive domain—computation (knowledge), comprehension, applications, and analysis. Result showed that the first model specifies the test classifications according to cognitive level but does not limit the relationships between cognitive levels to Bloom's hierarchy. The second model differs only in specifying this cumulative hierarchy.

Fandreyer (1984) in his study concept formation in mathematics using definitions studied achievement on the concepts proportion and similarity, and on understanding and applying definitions, which was measured with four tests at different levels of attainment (knowledge - synthesis; cf. Bloom's Taxonomy) and found that no significant differences among the three experimental groups were found in achievement on proportion at the knowledge and comprehension levels and the same pattern was found on understanding definitions and on applying them to problem solving.

Weiss (1984) in his study effects of short term continuing professional education on teachers’ attitudes and commitments to higher level thinking in mathematics problem solving using Bloom’s Taxonomy of educational objectives found no significant difference between the two groups in any of the cognitive areas. The experimental group increased substantially, thought not significantly, in their use of analysis and synthesis.

Waugh (1985) in his study Bloom’s Taxonomy and mathematics teaching, showed that Bloom's taxonomy is not hierarchical however, that the taxonomy can be a useful tool for planning mathematics syllabi and tests.

Tootle (1986) in his study analysis of the relationship between cognitive style and levels of learning as described in Bloom’s Taxonomy studied specifically the
field dependence-independence dimension and found that field independent subjects scored significantly higher than field dependent subjects on the comprehension and application level tests, however, there were no significant differences in their scores on the knowledge level test. The results indicate that field dependence has a differentiating effect in learning, but only at the comprehension and higher levels (the process levels). Further, it was found that in adult populations, as course content becomes more complex and test items more demanding (requiring a higher level of operative processing), a field independent cognitive style may be favorable for achievement of learning outcomes.

Pipes (1987) in his study the administrators’ role in enhancing the teaching of thinking skills, designed primarily for grade eighth, employed an integrated hierarchical approach using Bloom’s Taxonomy of Educational Objectives. The statistical tool used was analysis of covariance (ANCOVA). The improvements in achievement test scores for both the total battery scores and the thinking/reasoning scores were significant at the .05 significance level.

Hadaway (1992) in his study using writing to teach and learn geometry describes how students can demonstrate construction of knowledge by writing. Result showed writings provided frequent evidence of student construction of knowledge by comparing original responses to revised responses. On average, 50% of the students demonstrated construction of knowledge in a revision by attaining higher levels in Bloom’s taxonomy than in the original response.

Gierl (1993) in his study evaluating Bloom’s cognitive levels in the table of specifications for a grade 6 mathematics achievement test studied whether the taxonomy of educational objectives: cognitive domain provides an accurate model to guide item writers for anticipating the cognitive processes used by grade 6 students to solve items on a large-scale achievement test in mathematics. Students’ cognitive processes were classified using a coding system based on Bloom’s taxonomy. A comparison of response frequencies indicated that students used the cognitive processes described in Bloom’s taxonomy, but not in the same proportions as anticipated by item writers. Further, it was found that high and low math achievers use the cognitive processes anticipated by item writers. Post-hoc comparisons revealed that the match between expected and observed responses was highest for
comprehension items and that item writers were more accurate at anticipating the cognitive processes used by high math achievers. When student protocols on select items were examined, many different problem-solving strategies were identified demonstrating that the levels in Bloom's taxonomy, as used in test construction, conceal response variability. Overall, the results of this study indicated that Bloom's taxonomy does not provide an accurate model to guide item writers for anticipating the cognitive processes used by students.

Hinterlong (1993) in his study a qualitative analysis of seven general educational progress tests for higher level thinking skills in grades fourth and sixth used Bloom's Taxonomy to define the thinking skills because of its acceptance in the field of education. An analysis of the findings of the study provided the basis for three conclusions. First, general educational progress tests do not measure higher-level thinking skills. Second, general educational progress tests do not reflect the increased complexity of students' cognitive development. Third, the mathematics subtest, concept/application, measures more high-level thinking than the other subtests.

Gierl (1997) in his study comparing cognitive representations of test developers and students on a mathematics test with bloom’s taxonomy investigated whether bloom’s taxonomy offers item writers an accurate model for anticipating students' cognitive processes used to solve items on a large scale mathematics achievement test. Seventh graders thought aloud as they solved problems on the test. Researchers coded their cognitive processes using Bloom’s taxonomy. Results suggest that Bloom’s taxonomy does not provide an accurate model for guiding item writers.

Cohen (2001) is study the development and use of constructivist taxonomy in implementing the NCTM standards in elementary teacher education examined difficulties in implementing the National Council of Teachers of Mathematics (NCTM) curriculum and evaluation standards and proposed that instruction based on constructivist taxonomy of educational outcomes would be an effective alternative to the traditional Bloom taxonomy. It was found that strong majority of the pre-service teacher subjects reported that instructional activities based on the constructivist
taxonomy were responsible for their shift towards the vision of learning and helped them understand the course content better than activities based on a Bloom Taxonomy approach. In-service teachers who were asked to use the constructivist taxonomy reported that it helped them to clarify learning objectives and create lesson plans when using the constructivist taxonomy.

Bastick (2002) in his study gender difference for 6th -12th grade students over Bloom’s cognitive domain considered the possibility that different formats of objective test questions might differentially favor males or females and that males and females might respond differently to objective questions aimed at assessing abilities at different levels of Bloom's cognitive domain. Class tests were constructed on recently taught topics, with each test containing questions in three parallel subtests, multiple-choice, true-false, and matching. Each subtest had six questions, and each of the questions was targeted to one level of Bloom's Cognitive Domain by the test writers. Result showed only one significant difference in gender performances across the levels of Bloom's Cognitive Domain. A comparison of mean male and female scores on the three subtest formats also shows only one statistically significant advantage—an advantage for females on the matching questions. This was found to be due to significant female advantages at the Analysis and Synthesis levels.

Crawford & Brown (2002) in his study emphasized higher order thinking skills as primary concern within mathematics. He used Bloom's Taxonomy to create an appropriate format through which the developing levels of higher order thinking skills (HOTS) as a composition of content thinking, critical thinking, and creating thinking, and each feature of which offers an emphasis towards a separate level featured within Bloom's Taxonomy.

Deeney and Nicole (2005) studied teacher transformation through teacher inquiry in mathematics assessment practice. Methods of this study included analyzing of the collected artifacts from the teachers' collaborative inquiry activities. Artifacts were analyzed by coding methods, themes and patterns, knowledge and performance frameworks, the district's mathematics curriculum and Bloom's Taxonomy. The research findings showed that teachers based their mathematics assessment task
decisions on internal and external driving forces, they framed their method of assessment construction around design, frequency, and goals and they shifted their assessment practice, which transformed their teaching roles.

**Allwine (2006)** in his study current trends in social studies: a comparison of national and state standards found that state level goals for history and geography emphasized Bloom's Taxonomy of thinking skills. The lower middle school grades tended to emphasize comprehension, while the higher grades tended to emphasize analysis. The highest levels of thinking skills, synthesis and evaluation, were not highly stressed in the state goals.

**Gegan (2006)** in his study the effects of higher level questioning in a high school mathematics classroom focused his study on to address questioning and higher-level thinking in a low-level high school mathematics class. This study included a pretest that both groups took to determine their cognitive level or thinking prior to new information and modifications in teaching. The experimental group received modifications that included cooperative learning activities and higher-level questions over a six-week period. The modifications were aimed at helping them reach higher levels of Bloom's Taxonomy. The control group received the same information, but it was presented in a more traditional teaching manner. At the end of the six weeks, students in both groups were given a posttest to determine if they could answer higher-level questions.

**Lake (2008)** in his study assessed the effect of a community college mathematics teacher and curriculum reformation program: an application of a action research and conceptual change and attitudes toward mathematics. Results indicated that participants used lectures and assessed at the two lower levels of Bloom's taxonomy. They also reported experiencing cognitive dissonance from their participation and felt invigorated by the in service also students' prior math knowledge, and reading skills were the greatest barriers to implementing research-based instructional and assessment approaches.

**Nielsen (2009)** in his study the relationship between pedagogical content knowledge and mathematics teacher questioning strategies focused his study to
improve teacher questioning strategies and promote higher-level questioning based on Bloom's Taxonomy of cognitive categories and found that there was no significant relationship found between teachers' pedagogical content knowledge on the post-test and teachers' use of high-level questions as defined by Bloom’s Taxonomy.

Petkova (2009) in his study classroom discourse and teacher talk influence on English language learner students’ mathematics experience examined the features of the classroom discourse in eight Algebra I classes from two urban high schools with diverse student populations. It was found that the novice teachers frequently used almost the same strategies as their more experienced colleagues did. Yet the qualitative analysis of the type of modifications to their speech they made, the type of questions they asked, and the provision of information of higher cognitive demand according to Bloom’s Taxonomy indicated that even though all teachers needed improvement in using these strategies.

Jaffe (2010) in his study determined if mathematical understanding, performance, and attitudes improve when students participate in lessons designed to allow them to use their strongest method of communicating mathematical ideas (MCMI)—writing, speaking, diagramming, modeling, and symbolizing. Tenth grade geometry students in a public high school were grouped by their strongest MCMI and performed tasks in which they approached problems using their strength. Their level of understanding was determined based upon the level of Bloom's revised Taxonomy at which they performed. It was found, from student responses during the interviews it was clear that mathematical confidence improved particularly for low performing students.

Johnson (2010) in his study improving rigor and engagement through communities focused on how communities of practice foster change to improve rigor and engagement in math classrooms in grades three and four. The third and fourth grade teachers met in communities of practice with the goal of increasing the rigor and engagement in their math classrooms. Results indicated that the teachers and administrator perceived the intervention of the teachers meeting together to examine student work, share lessons and activities added to the engagement and rigor in the
The use of rating charts by the teachers to examine Bloom's Taxonomy levels and types of engagement were also perceived as valuable by the participants of the study.

**Hawks (2010)** in his study the effects of implementing Blooms' Taxonomy and utilizing the Virginia standards of learning curriculum framework to develop mathematics lessons for elementary students focused to determine if teachers who developed lessons based on Bloom's Taxonomy and the Virginia Standards of Learning Curriculum Framework saw increased scores on the mathematics benchmark assessment for fourth grade. The mean of the posttest scores for the experimental group in which the teachers developed lessons using Bloom's Taxonomy would be significantly higher than the mean of the group which used textbook bound instruction.

**Wruck (2010)** in his study computer-mediated communication: Instructional design strategies that support the attainment of bloom’s higher order cognitive skills studied purposes of improving instructional design techniques, if a pattern existed between five selected instructional design strategies and the level of cognition, based on Bloom's taxonomy. The computer-mediated communication (CMC) instructional strategies discussed in this study include (a) read and respond (b) scenario (c) case study (d) controversy/debate and (e) search and critique. The findings of this study show that the learners achieved the application level of cognition (Bloom's level 3) when responding to four of the five CMC instructional strategies controversy/debate, case study, scenario, and search and critique. Learner responses achieved a cognitive level of comprehension (Bloom's level 2) when responding to read and respond instructional strategies. The results also showed that only 4% of the learner responses achieved Bloom's higher order cognitive level of synthesis or evaluation, whereas 83% of all learner responses in this study fell between Bloom's comprehension (level 2) and analysis (level 4). Although the research shows that a pattern exists, the results also show that learners did not achieve the desired higher levels of cognition that would involve critical thinking skills.
Review;

Investigator found few studies related to Bloom’s Taxonomy and particularly in relation to Parental involvement in academics. (Little, 1981; Moore, 1982) in his study found co-relation between knowledge, comprehension, application, analysis categories and supported the hierarchy between them. (Congero, 1981) found the relationship between cognitive style and academic achievement. (Corington, Helen and Tiballi, 1982; Ekstrand, 1982) found hierarchical co-relation with in cognitive domain of Bloom’s Taxonomy. (Tootle, 1986) found higher achievement at knowledge category then at comparison and application category. (Weiss, 1984; Fandreyer, 1984; Waugh, 1985) found no hierarchical and co-relation between cognitive objectives. (Hadaway, 1992) found students doing better at knowledge objective. (Hawks, 2010) found the mean of the post test scores for the experimental group using Bloom’s Taxonomy higher than the mean of the group which used textbook instruction. (Wruck, 2010) found that learner responses were much higher between comprehension and analysis category as compared to higher order cognitive category.

1.5 Emergence of the Problem

The present investigation puts forth a multidimensional representation of Parental Involvement. The review of related research reveals that parental involvement is one of the key factors which have a major bearing on the development of a child. Researches reported on this variable have focused around varied dimensions of parental involvement. Results of many researches reveal that Parental Involvement plays a significant role in the child’s education and affects the child’s accomplishments in the long run. Parental participation in home work affected the mathematics achievement (Park, Byun and Kim, 2011), on high school students (Cho and Campbell, 2011). Three major dimensions in which parents reportedly get involved with their children development are behavioural involvement, personal involvement and providing intellectual climate at home. Incidentally as many as 110 types of factors of parental involvement have been shown to affect development of child (Hass, 1969). Within the domain of personal involvement direct time given to
child is the most prominent factor. Apart from direct participation, indirect and encouraging emotional climate also left a positive effect on mathematics performance. Besides above there are studies which reveal no difference with and without parental involvement (Powell, 2010). But one of the significant fact about these researches is that all of them have been conducted in different cultural settings. Only 1 to 2 percent studies have been reported on Indian culture. It makes it all the more important that such conclusions be validated for Indian adolescents in typical Indian social and cultural milieu. It is therefore, to difficult to generalize these findings for Indian settings because Parental Involvement is a variable which has its roots in culture and the modes and expressions of parental Involvement are different in Indian culture.

Also, studies placed on record have addressed the global aspects, but in respect of taxonomy investigator could find few studies, therefore, need of conducting precise investigation is clearly indicated. Hence, the present investigation is designed to fill up the gap in role of Parental Involvement with respect to Taxonomic Categories. It is therefore, a humble attempt of the investigator to investigate these variables in Indian setting. Hence the problem has been stated as follows:

1.6 Statement of the Problem

The present research investigation is entitled as:

EFFECT OF PARENTAL INVOLVEMENT ON PERFORMANCE OF ELEMENTARY SCHOOL STUDENTS IN MATHEMATICS AT BLOOM’S TAXONOMIC CATEGORIES

1.7 Delimitation of the Study

The study has been delimited in respect of:

- Only the CBSE schools were taken for the study.
- Only cognitive domains of Bloom’s Taxonomy were taken for mathematical performance i.e. Remembering, Understanding and Higher Order categories.
- The classes VI, VII and VIII of the elementary schools for the study were taken.
1.8 Objectives of the Study

The study has been designed in order to attain the following objectives:

- To develop the tests for selected Mathematical Skills, separately for grade VI, VII and VIII.
- To study the performance in Mathematical Skills at different Taxonomic Categories, for students of VI, VII and VIII grades.
- To study the effect of Parental Involvement on performance in Mathematical Skills of VI, VII and VIII graders.
- To study the interaction effects of Taxonomic Categories and Parental Involvement on performance in Mathematical Skills, of students of grade VI, VII and VIII.

1.9 Hypotheses

Following hypothesis were formulated to achieve above mentioned objectives:

Ho.1: Mean achievement scores on Mathematical Skills of VI graders belonging to different levels of Parental Involvement do not differ.

Ho.2: Mean achievement scores on Mathematical Skills of VI graders on different taxonomic categories of objectives do not differ.

Ho.3: Parental Involvement and categories of Bloom’s Taxonomy do not interact in respect of mean achievement of Mathematical Skills of VI graders.

Ho.4: Mean achievement scores on Mathematical Skills of VII graders belonging to different levels of Parental Involvement do not differ.

Ho.5: Mean achievement scores on Mathematical Skills of VII graders on different taxonomic categories of objectives do not differ.

Ho.6: Parental Involvement and categories of Bloom’s Taxonomy do not interact mean achievement of Mathematical Skills of VII graders.

Ho.7: Mean achievement scores on Mathematical Skills of VIII graders belonging to different levels of Parental Involvement do not differ.
Ho.8: Mean achievement scores on Mathematical Skills of VIII graders on different taxonomic categories of objectives do not differ.

Ho.9: Parental Involvement and categories of Bloom’s Taxonomy do not interact in respect of mean achievement of Mathematical Skills of VIII graders.