1.0. Reading Difficulties

In the modern world, the academic performance is a key factor in determining achievement and academic success of people. Therefore, learning to read is an important dimension of academics. In attaining important life benchmarks, reading plays a pivotal role. Reading difficulties (RD) are associated with long-term poor academic achievements. RD involves poor accuracy, lack of fluency, poor word recognition and difficulty in word decoding, difficulty in phonological awareness, poor reading prosody, poor intonation, pitch, phrase, etc. in oral reading and reading comprehension. The common indicators are difficulty with phonemic awareness and sound-symbol correspondence. Phonemic awareness is the ability to work with distinct sounds in oral words. Sound-symbol correspondence is the matching of letter combinations to specific sounds. These difficulties interfere with academic achievement or activities of day-to-day correspondence. People suffering from reading difficulties show poor performance in their reading tasks which is well below the level one would expect in spite of their general intelligence, educational opportunities, motivation to learn to read, emotional self-control and physical health, etc. Some common problems associated with people with RD are: poor comprehension while reading either aloud or silently, omission and reversals of words or letters while reading, difficulty in decoding letters or words and sound-symbol correspondence, problems with spellings, repeating and substituting words, etc.

An estimated of 80 percent of learning disabilities (LD) have reading disabilities (Lerner, 1993). The prospect for struggling readers is poor unless effective early reading interventions are implemented. (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Juel, 1988). Few researchers have examined the effectiveness of early literacy interventions for students with disabilities in particular (Fuchs et al., 2002). Because reading difficulties are difficult to remediate at the later stage of life, early identification and intervention are essential (Morocco, 2001; Torgesen, 1998). Difficulties in reading
hinder performance across several academic achievements, occupational competencies, and other skills that are used in day to day life activities. Some children are successful in reading while there are others who are at-risk. The National Assessment of Educational Progress (NAEP, 2000) found that by the fourth grade 37% of students failed to acquire basic reading skills. This problem is particularly common and acute in poverty stricken areas (Hart & Risley, 1995). There are teachers who have less expertise in teaching at-risk children and the children begin to fall further behind (Ferguson, 1991; Ferguson & Ladd, 1996; Kain & Singleton, 1996). Reading failure paves the way for special education or eventually school drop-out (Snow, Burns, & Griffin, 1999).

The reading problems are diagnosed taking into account the child's age, intelligence, educational opportunities, and cultural factors like different languages spoken at home and taught at school. As stated earlier, reading disorders are diagnosed when a child's reading achievement is substantially below what would be expected after taking the above factors into account.

In India, the area of Learning Disabilities is an upcoming field of study and has gained salience in the last two decades. Though there has been an increase in the practice of identification of individual children with RD along with the underlying causative factors like cognitive, linguistic, and neurophysiologic factors, the research and intervention practices are at the nascent stage in India and need greater focus. As the number of students with reading difficulties is rising, educators must find ways to teach these students in the language they are trying to acquire. As India is a multicultural and multilingual nation, the instructional needs of these students are numerous and multifaceted due to the weaknesses in the language skills (Meskill, 2005). While formulating the intervention programmes for such students, care must be taken to adjust scaffolds in accordance with the growing competencies of the student (Kelly, Gomez, Chen, & Schulz, 2008).

Understanding regarding early reading development has grown tremendously in the last three decades (National Reading Panel, 2000; Raynor, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001; Stanovich, 2000). We have now sound knowledge about phonemic awareness and letter-sound correspondences to understand how to read text accurately (Share & Stanovich,
There is knowledge about the relations between phonemic decoding skills, reading fluency (Ehri, 2002), and reading comprehension (Samuels & Farstup, 2006). However, in spite of the evidence-based knowledge, the greatest problem is in implementing them effectively in our schools (Pressley, 2002). This is because of lack of dissemination of knowledge and skills to the teachers for explicit, systematic, and motivating instruction. Apart from this there is lack of instructional facilities. Inadequate financial and personnel resources make it difficult to provide the intensive instruction necessary to help these students.

Prevalence of Reading Difficulties in India

The field of learning disabilities is an upcoming one and at its nascent stage. So the information regarding learning and reading disabilities is scanty. It is only for the last two decades that Indians are into researches regarding disabilities (Ramaa, 2000) and are lagging behind from western countries in the researches in learning and reading disabilities (Karnath, 2001). There are ninety million people supposed to be suffering from different types of learning disabilities in India and there are five students with learning disabilities in an average class in schools (Thomas, Bhanutej & John, 2003). It has been reported that there are incidences of dyslexia 2-18%, of dysgraphia 14%, and of dyscalculia 5.5% in primary school children. However, awareness about learning disabilities to be an important cause of academic underachievement has recently increased (Karande & Kulkarni, 2005). Children in slum schools have comparatively more language deficits than children in middle SES schools but their arithmetic deficits are not as poor in comparison (Kapoor, 2008). In a study in Kerala, 8.2 percent prevalence of reading difficulty was reported. Younger age, male sex, poverty, lack of education in parents, psychiatric disturbance, poor school attendance and performance, poor physical health, poor motor coordination and impaired vocabulary and visuospatial reasoning were all attributed to reading difficulties (Bhakta, Hackket, & Hackket, 2002).

Despite this growing interest regarding the incidence and prevalence of LD, we do not have a clear idea about the incidence and prevalence of learning disabilities in India (Karnath 2001), as the methodologies used for the prevalent studies are not uniform and are confined to the specific regimes of the country. In fact, the difficulties range from the very definition of LD, identification, assessment, to socio-cultural factors unique to India.
(Sakhuja, 2004). Lack of awareness poses a major difficulty in early identifications. The scarcity of trained persons in the field of special education in India makes assessment and identification a tiresome and difficult procedure (Nakra, 1996; Birla, 2001; Times India Network, 2004; Times News Network, 2005). Lack of trained special educators to help students with learning disabilities also is a big problem in India (Birla, 2001). Often due to ignorance, parents often refuse to accept their wards as learning disabled (Nakra, 1996). A majority of schools in India are not equipped to deal with the special needs of the children with learning disabilities (Birla, 2001; Thomas, Bhanutej & John, 2003; Spaeth, 2003; Srivastav, 2004; Times India Network, 2004). India is a multilingual and multicultural nation. Therefore, developing a single and standardized assessment tool is difficult.

1.1. Reading Process

According to the National Reading Panel (2000), the five components of reading are phonemic awareness, phonics, fluency, vocabulary and comprehension. The reading process involves two highly interrelated areas, i.e., word identification and comprehension. Difficulties in word recognition significantly affect the ability to comprehend (Lyon, 1995; Torgesen, Rashotte, & Alexander, 2001). Thus, automaticity and fluency are critical issues in reading competence.

1.1.1. Automaticity and Fluency

Automaticity can be defined as fast, accurate and effortless word identification at the single word level. Automaticity determines the ability for comprehension. Fluency, on the other hand, involves automatic word identification as well as appropriate prosodic features like rhythm, intonation, and phrasing at different levels of reading, i.e., the phrase, sentence, and text levels. Fluency involves anticipation or apprehension of what will be the next word in the text (Wood, Flowers, & Grigorenko, 2001). This anticipation also determines reading comprehension.

1.1.2. Relationships among phonemic awareness, phonics and orthographic reading

According to Jeanne Chall (1983), fluent reading develops during the second stage of reading, i.e., Ungluing from Print. For most students this stage comes when they are in
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second to third grade levels. This is the last stage of "learning to read" and after this comes the stage of "reading to learn." The narrative text shifts to expository one and the complexity of the written material also increases dramatically. The importance of fluent reading and background knowledge for comprehension also increases.

Orthographic representations are the specific letter pattern for a whole word. There is a strong relation between automatic reading and orthographic representations. This means fast and accurate reading involves identification of whole words made up of specific letter patterns. For example, English orthography is alphabetic in nature and the word identification involves phonic word attack strategies, i.e., letter-sound association. Word attacks are based on phonemic awareness which helps in mapping speech to print. Most children go through this process easily. However, there are "at risk" children (approximately 20-40% depending on the type of school) who have phonemic awareness and phonic word attack problems. They ought to be taught strategically and systematically. Still there are some children who need more intensive teaching. It is found that children who struggle with learning to read also fail to develop adequate automaticity, i.e., orthographic reading. Because there is lack of metacognitive skills, children with LD exhibit certain problems like associating meaning with words (semantics), recognizing and recalling specific details, making inferences, drawing conclusions, and predicting outcomes. Metacognition controls the overall planning of a cognitive task like self-instructions, self-monitoring, or checking the completion of task appropriately (Bender, 2004). Early intervention is important in the development of automaticity and fluency (Torgesen, Rashotte, & Alexander, 2001).

The relationships among the processes involved in word identification are illustrated in Figure 1.1. At the bottom, the figure depicts phonemic awareness which forms the basis for all word identification skills.
However, there is a reciprocal relationship between the development of phonemic awareness and the development of phonic word attack strategies. More familiarity with letters leads to improved phonemic awareness and ultimately there emerges strong orthographic patterns.

1.1.3. *Simple View of Reading*

There are some specific views regarding reading. The formula of Simple View of Reading (SVR) presents Reading Comprehension (RC) as the product of Listening Comprehension (LC) and Decoding (D). The equation is stated as: \( RC = LC \times D \). The SVR was adopted by the Rose Report (Rose, 2006; DFES, 2006). So any discrepancy in any of the three variables leads to reading problem. This equation was put forward in 1980s as an attempt to patch up the two opposing camps of early literacy teaching – the Whole Language or ‘Real Books’ approach on the one hand and the Phonics view on the other (Gough & Tunmer, 1986). These two approaches are often represented as ‘top down’ and ‘bottom up’ approaches. Some researchers advocate that reading involves both, but many consider that the relationship between them has not been shown adequately in the SVR equation.

1.2. *Reading Interventions*

The dictionary meaning of “intervention” is “the action of intervening, stepping in, or interfering in any affair, so as to affect its course or issue” (Simpson, & Weiner, 1989). In the area of reading research and practice, “intervention” is the most demanding word.
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Reading interventions have become the greatest area of concern for children with reading difficulties.

Components of Effective Early Reading Intervention Programmes

The National Institute of Child Health and Human Development (NICHD, 2000) suggest the following components essential for reading intervention programmes (Pinnell, 2000): phonological awareness, visual perception of letters, word recognition, phonics/decoding skills, phonics/structural analysis, fluency/automaticity, comprehension, a balanced, structured approach, and early intervention/individual tutoring.

Any intervention is effective only when it is executed properly in correct manner (Gansle & McMahon, 1997; Henggeler, Melton, Brondino, Sherer, & Hanley, 1997; Yeaton & Sechrest, 1981). Treatment integrity is a concept that has become problem for many intervention programmes (Noell, Witt, LaFleur, Mortenson, Ranier, & Levelle, 2000; Noell, 2008). It is the degree and extent to which an intervention is planned (Peterson, Homer, & Wonderlich, 1982).

Reading interventions can be of three main types: (1) Comprehensive interventions include new or restructured literacy programmes designed for groups of children. (2) Focused interventions are basically supplemental to the existing programmes so as to enhance children’s skills and knowledge base. They are designed for groups, subgroups, or individuals. (3) There is another category of comprehensive intervention that are designed for individuals and subgroups of children who do not respond well to existing programmes.

Fundamental Approaches to understand the Reading Skill Acquisition Process

There are some fundamental approaches to understand the reading skill acquisition process in education. According to Chall (1967), there are two developmental approaches to reading: code-emphasis or meaning-emphasis approaches.

Code–emphasis approach focuses on developing skills in students to convert print into its spoken language equivalents. This approach uses single letters and letter combinations so as to teach students to read words in which those letters sound the same.
For example, c-a-t is cat, while m-a-t is mat. This is known as sound-letter correspondence. Thus, it focuses on word-attack and word-recognition skills. In code-emphasis programmes, a new word generally is not introduced until students have mastered the letter-sound correspondences that make up the word. For example, the word mat is not introduced until the students know the sounds for the letters m, a, and t. This approach emphasizes that in order to learn reading, a large number of sight words (words that are not sounded out) are to be learned and some decoding strategies like sounding-out strategies should be adopted (Stein, 1993; McIntyre & Freppon, 1994).

Meaning Emphasis approach – This approach emphasizes the reading of words that occur frequently in spoken language, regardless of the letter-sound irregularity of the words. It does not systematically teach phonics but emphasizes word meaning. The two approaches can be distinguished in the way they select words. Code-emphasis programmes initially select words made up of letters and letter combinations representing the same sound in different words. For example, the word "sat" and "land.").

In contrast, in meaning-emphasis programmes initially the student is required to select words that appear frequently in print regardless of their letter-sound irregularity believing that frequently appearing words are familiar and to learn. Pictures, context of the story, word configuration, and initial letter—as are used as cues in decoding words (Carnine, Silbert, Kame'enui, & Tarver, 2004).

Whole language is a meaning-emphasis approach where words are not selected at all rather the literature is selected and students read whatever words are in the text. In whole-language teaching, meaning is not only the goal of reading instruction but also the means through which children learn to read (Goodman, 1986). They do not learn reading skills first and then apply them to pronounce words and get meaning; instead, they first get the meaning and then use meaning cues to decode unfamiliar words. They move from understanding the whole text (i.e., the meaning) to recognizing the meaning of paragraphs, sentences, phrases, and words. Thus this approach emphasizes the interrelatedness of spoken and written language and student’s own experiences to learn reading. The meaning and strategy instructions are emphasized. The graphophonic, syntactic, semantic and pragmatic aspects of language are emphasized to develop the language skill. Whole Language emphasizes that learning to speak and learning to read
can be easily and effortlessly learned. This is in contradiction with code-emphasis approach which advocates that there are different developmental paths for speech and reading. Speech is a wholly natural and an integral part of a child's language. Learning to read is a different process involving sight words and decoding strategies. Kaatz-Sulgrove, Peck & McLaughlin (2002) evaluated the efficacy of both code and meaning emphasis approaches to reading instruction with students who had mild disabilities a cognitive, intellectual achievement which learning to speak is not. So, it is simply wrong to assume that reading and speaking can be learned in the same way (Liberman & Liberman, 1991). Overall, the results of this study indicated that code-emphasis instruction resulted in more accurate and more fluent reading than meaning-emphasis instruction for these participants. These results were more pronounced for the students with mental disabilities than for the students with learning disabilities.

The code-emphasis reading programmes have many criticisms and the most common criticism is that this approach degrades text and decontextualizes activities by simply matching letters to sounds (Graham & Harris, 1997; Goodman, 1986). Because of the limited and controlled vocabulary children sound out every word and they do not learn to appreciate literature (Guthrie & Cunningham, 1982). Because the focus is too much on lower-level reading skills, this approach is not suitable for students with disabilities (McGill-Frazen & Allington, 1991; Palincsar & Klenk, 1992). On the contrary, meaning-emphasis approach to reading instruction follows two major principles: to build proficient reading skills using children's own knowledge through the use of functional, authentic reading tasks (Goodman, 1986). Teaching sound-symbol relationships is rejected (McIntyre, 1993; Palincsar & Klenk, 1992; Reid, 1993). With a meaningful context, children can learn to read as naturally as they learn to speak (Goodman, 1992; Vacca & Rasinski, 1992). Besides this, phonics instruction is definitely provided after a child has learned to read (Routman, 1988).

Stahl & Miller (1989) in their study compared the effectiveness of basal (i.e., code-emphasis) and language experience (i.e., meaning-emphasis) reading approaches. The findings indicated that both the approaches were equally effective on achievement in reading and attitudes toward reading. For kindergartners, it was the language-experience approach which was more effective. But this approach was not effective with children
from disadvantaged and low socioeconomic (SES) populations. In another analysis, Stahl, McKenna, & Pagnucco (1994) found that students who received meaning emphasis instruction performed better on comprehension questions and those who received traditional code emphasis instruction performed better on decoding activities. Children with disabilities have problems with phonological processing, so code-emphasis approaches may prove beneficial than meaning-emphasis (Adams, 1990).

The remedial approaches to reading include: Multi-sensory approaches and Behavioral approaches. A multi-sensory approach helps students learn language through more than one of the senses at the same time. Students are taught using all the sense for learning (visual, auditory, kinesthetic or tactile) simultaneously, in order to enhance memory and learning. Fernald VAKT approach (Mather & Jaffe, 2002) and Orton-Gillingham approach (Julius, 2009) is multisensory approaches that use all sensory modalities (visual, auditory, kinesthetic, and tactile).

The Fernald Method is a systematic, multisensory instructional approach which emphasizes that sensory and perceptual cues reinforce the mental image of words as well as the association between printed words and their oral presentations. The Orton-Gillingham approach is another unique language training system designed by Dr. Samuel Orton and Anna Gillingham (Julius, 2009). The Orton-Gillingham approach incorporates all three multisensory pathways in the development or remediation of language skills. These remedial approaches are very much in use with dyslexics. Children with dyslexia or reading disabilities often exhibit weaknesses in auditory and/or visual processing. They may have weak phonemic awareness, difficulty in rhyming words, blending sounds to make words, or segmenting words into sounds, difficulty acquiring a sight vocabulary. Basically, they do not respond to the alphabetic code system. Using this approach, they can learn alphabetic patterns and words by utilizing all the senses. Wrighton (2010) examined the effectiveness of a multisensory approach to teaching alphabet and phonemic awareness skill development to kindergarten children.

Another remedial approach is behavioral approach. Human behavior is learned, thus all behavior can be unlearned and new behaviors can be learned in its place. This approach can be used in both clinical and educational setting. Behavioural approaches can be used
in the form of: punishment, self management, shaping, and systematic desensitization. Behaviourism focuses on one particular view of learning: a change in external behaviour achieved through a large amount of repetition of desired actions, the reward of good habits and the discouragement of bad habits. This view advocates that the "teacher" is the dominant person in the classroom and takes complete control. The learner does not have any opportunity for evaluation or reflection within the learning process. Behavioral approaches emphasize (a) reinforcement of correct responses (b) correction of errors (c) monitoring of progress and (d) high structuring of the educational environment.

The present study combines both developmental and remedial intervention approaches using three different strategies such as (1) Peer Assisted Learning Strategies (PALS), (2) Computer Assisted Instruction (CAI) and (3) Traditional Classroom Teaching (TCR).

1.3. Peer Assisted Learning Strategies (PALS)

PALS is a peer-tutoring programme for use in elementary school classrooms to improve student proficiency in reading. Its purpose is to supplement student’s existing reading curriculum. PALS was developed for use with students with diverse academic needs and has been used in language learning. Peer assisted learning (PAL) is defined as the learning of knowledge and skill by actively participating, cooperating and supporting peers of equal status (Topping, 1996). In another definition the process of PAL has been described in which people who are not professional teachers belonging to the same socio-cultural background help each other in learning (Topping, 1998). This reciprocal feature of PALS has attracted the researchers. This is a minimal cost intervention programme and so can be particularly helpful in special education, where the teachers are demanded to implement new instructional methods with minimum cost (Nestel & Kidd, 2003).

Children with disabilities will only get benefitted when the research works take the form of practice. So the field of special education must strive to close the research and practice gap. Peer assisted learning strategies (PALS) that has originated in general education, but through extensive research has become a viable option for instructing students with disabilities.
1.3.1. Peer-Mediated Instruction and Special Education

Peer-mediation has been found to be a useful resource method of instruction since ancient times. For instance it was basically used for financial and practical purposes only (Hornby, Atkinson, & Howard, 1997). It is only for the past half a century that peer mediation has been utilized for educational purposes. The prominent feature in peer mediation is peers teaching peers. This has proven to be an empirically validated practice.

There are many lacunae that strain the capacity of conventional instructional methods to address all students learning needs. It was in the late 1700s that Andrew Bell (Topping, 2001) utilized peer mediation as an alternative to teacher directed instruction. This peer tutoring resulted in not only academic benefits but also social, emotional, behavioural, and academic benefits. And this became the history, a promising alternative to conventional instructional method. Thus peer mediation laid down the foundation for one of the most effective strategies for teaching students with diverse needs in the classroom wherein children work together to support each other’s learning in collaboration.

There are various forms of peer tutoring like cross-age tutoring (CAT), Cooperative Integrated Reading and Composition (CIRC), Reciprocal Teaching, Class Wide Peer Tutoring (CWPT) and Peer-Assisted Learning Strategies (PALS).

*Cross-Age Tutoring:* In cross-age tutoring, older students teach younger students. It is one of the most prevalent forms of peer mediation tutoring that are used by teachers to meet the educational needs of students with disabilities (Hall & Stegila, 2003).

Two other collaborative learning methods in the area of reading are Cooperative Integrated Reading and Composition (Stevens et al., 1987) and Reciprocal Teaching (Palincsar & Brown, 1984).

*Cooperative Integrated Reading and Composition (CIRC):* In CIRC, teachers instruct through usual classroom basal and direct instructions. Basal instructions are given daily whereas direct instructions are implemented on weekly basis. Instructions are the lessons
on comprehension and metacognitive strategies. This tutoring incorporates oral reading in pairs, decoding the text, prediction and summarization activities. A token is given in the form of reward is included.

*Reciprocal Teaching*: A reciprocal approach provides students with the opportunity to have discussion and dialogue with the teachers regarding different aspects of the text so as to arrive at a meaningful conclusion. While reading they learn and practice the following comprehension strategies: formulating questions, summarizing, clarifying word meanings, and predicting the content in subsequent paragraphs.

Because these approaches were not practical for many teachers, a third approach was formed. It has been found that (a) appropriate small groups of students (b) strategy instruction (c) extended practice opportunities (d) corrective feedback (e) breaking down tasks into smaller chunks lead to significant improvement in reading skills.

*Class Wide Peer Tutoring*: CWPT is an alternative form of CAT that can be utilized within the classroom. It is basically the summation of an increase in practice opportunities with immediate feedback and delivery of instruction in small groups (Greenwood; Delquadri & Hall, 1989). With CWPT children work in pairs. With its replications, it became a popular strategy for teachers teaching reading and spelling to diverse learners. Thus, it incorporates teamwork, increased opportunities to respond to instruction, and high levels of engaged learning. To enhance the effectiveness of CWPT, in 1989, Greenwood and Delquadri in collaboration with Debbie Simmons planned to develop another be a combination of (a) CIRC and Reciprocal Teaching and (b) CWPT activities. This strategy has proven beneficial for low and average achieving students in developing their reading skills, as well as for the children diagnosed with learning disabilities. This modified CWPT is known as *Peer - Assisted Learning Strategies*.

*Peer Assisted Learning Strategies*: PALS is primarily a reading comprehension programme. Reading strategies like phonological awareness, decoding activities, and comprehension strategies were integrated into a CWPT framework. PALS was designed both for reading and mathematical activities for students with disabilities (Calhoon & Fuchs, 2003). PALS is a 25 to 35 minute reading activity usually implemented 2-3 times per week, providing intensive practice on reading and comprehension strategies. It is designed to complement,
not replace, existing reading curricula. Before starting with the session, pairs are made. Every student in the class is paired such that each pair includes a higher ("coaches") and a lower ("players") performing student. Although tutoring roles are reciprocal, the high performing student in each dyad reads first for each activity to serve as a model for the other student. Both students read from material appropriate for the lower reader. Approximately 13 to 15 pairs of students are created in the classroom. During PALS students participate in three essential reading activities- Partner Reading, Paragraphs Shrinking and Prediction Relay.

Each session begins with Partner Reading which improves students reading accuracy and rate. After both students have read one partner then retells the sequence of events in the text just read. The second activity is Paragraph Shrinking, which is designed to develop comprehension through summarization and main idea identification. The final Activity is Prediction Relay which is supposed to extend already shrunken paragraph to larger units of texts so as to make more meaningful and then to make, confirm or disconfirm predictions.

The major highlights of the PALS programme are: (a) Verbal rehearsals in the form of discussion and dialogue exchange. (b) Feedback for both correct and incorrect responses. (c) Frequent verbal and written interaction between tutor and tutee. (d) Reciprocity (i.e., each student serves in the role of tutor and tutee during each session).

The peers work with their partners through modeling, monitoring, networking, collaborating and tutoring that enhance the cognitive elements and thus significantly influence academic achievements (Hartup, 1992). These components are based on the principles of applied behavioural analysis, social learning theory, and mastery learning (Utley & Mortweet, 1997).

As Tutee: As tutees, students with reading difficulties are provided with explicit instruction, frequent opportunities to respond, frequent feedback, repetition and are required to be actively engaged in the learning process (Bowman-Perrott, 2009). The contents of learning are based on learner’s specific academic needs. The tutees learn various concepts like spelling, mathematical computation, reading comprehension, and reading fluency. Emotionally also they feel confident and satisfied.
As Tutor: Students can also act effectively as tutors (Cook, Scruggs, Mastropieri, & Casto, 1985-1986). When they act as teacher, they show improved knowledge regarding the content matter they are teaching. There is an increased socio-behavioural interactions with their peer mates which is more pronounced amongst students having emotional or behavioural disorders (Cook, Scruggs, Mastropieri, & Casto, 1985-1986).

Originally, PALS was designed for use in second – through sixth – grade classrooms. More recently, both upward and downward extensions of PALS have been developed, resulting in Preschool PALS, Kindergarten (K-PALS), First – Grade PALS and High – School PALS.

Since there is continuous rise in the school drop outs because of disabilities, PALS is a viable option in improving academic achievement, specifically reading.

1.3.2. Cognitive Models of Peer Learning

Peer tutoring can take place in either of the two ways. In one situation, an older or more able peer will tutor a younger peer i.e., one of the peers is at an earlier stage of cognitive development. This leads to cognitive conflict and is the basis of Piagetian theories of cognitive constructivism. In the other situation the peers will still be at different stages of development, but their relative levels will be closer together. This allows them to co-construct new meaning and cognitive structures from learning experiences. They combine and splice ideas together. This is the basis of Vygotskian co-construction. Though there are differences between both the peer learning theories, but peer interaction is the common factor amongst both of them (Blatchford, Kutnick, Baines & Galton, 2003). Sharing, cooperation and competition is the key to motivation in any relationship.

Piagetian cognitive conflict peer learning

Piaget (1978) proposed that the processes of assimilation and accommodation make the child to learn understanding, leading to the construction of internal schemas for understanding the world. This has been termed cognitive constructivism. Theories of collaborative learning have come from the theories of equilibration. This learning model emphasizes that there has to be settlement between prior and newly experienced beliefs for the learning to take place. Peer learning is only productive till there are conflicts between the existing and the new beliefs (Foot & Howe, 1998). This leads to the existing
cognitive structure being displaced by a new structure. The role of peer interaction is very important here as peer interaction would instruct, tutor and lead learners towards internal cognitive development. These Piagetian peer learning techniques have been successfully implemented in schools in literacy, mathematics and science (Webb, 1989; Howe et al., 1995; Robinson et al., 2005). De Lisi and Golbeck (1999) presented a model of how peer learning promoted cognitive growth through Piagetian principles (Figure 1.2).

![Diagram of social constructivism through Piagetian conflict](adapted from De Lisi & Goldbeck, 1999)

Figure 1.2: Social constructivism through Piagetian conflict (adapted from De Lisi & Goldbeck, 1999)

The operational cognitive system is responsible for the cognitive growth. The operational cognitive system controls thinking processes. Hypothesis developed within the operational system are tested with a peer learner. This may lead to assimilation that means the child allows the event to enter the cognitive structure in order to infer meaning. This in turn leads to accommodation where the cognitive structure is influenced by the event. However, it is
not necessary that the accommodation is permanent here. Accepting a new cognitive structure is a more intricate process and depends on the child gaining deeper understanding of the new cognitive structure leading to equilibration, i.e., successful modification of the cognitive structure. This results into three situations. Either the new cognitive model does not manifest itself as different from the existing model. So, there is no perturbation. If ‘perturbation’ exists between new and old cognitive structures then the child will go through a process of perturbation-regulation-compensation sequences. At this point the child may either reject the new model thus returning back to the old model or the new cognitive structure is accepted by the child thus causing the change in the child’s cognitive systems.

Vygotskian cognitive co-construction peer learning

Co-construction is another way by which peer tutoring can take place. According to this approach, the peers are at different stages of development but relatively closer together in their levels, co-construct new meaning and cognitive structures from learning experiences. This is the basis of Vygotskian co-construction. Vygotsky (1978) placed greater emphasis on the role of social interaction, language and discussion in the development of understanding, to allow children to scaffold each other’s learning and co-construct. This has been termed social constructivism. He gave emphasis to mediation as an important element in developing higher psychological functioning. ‘Every function in the child’s (cultural) development appears twice: first on the social level and later on the individual level- first between people (interpsychological) and then inside the child (intrapsychological)’ (p 56). He explained the role Zone of Proximal Development (ZPD) for peer learning and defined it as ‘the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers’ (p 57). Intersubjectivity functions within ZPD leading to more effective intra-psychological functioning. Intersubjectivity can be thought of the extent to which two subjects can engage in conversation and dialogue that reflects their own worlds or minds. Adults can find it difficult to make that transcendence to the world of the child (Donaldson, 1987). Therefore, peers prove effective here in dealing other peers by forming intersubjectivity to facilitate cognition. Vygotsky suggested that learners were able to ‘perform.... in collaboration with one another that which they have not mastered
independently’ (p 87) thereby emphasized dialogue being important for cognitive growth and so is the peer interaction. Peer interaction allows internalization and long term cognitive growth. Through questions, discusses, debates, peers extend the thinking of their partner. Topping and Ehly (1998) provide a theoretical model as to how peer learning promotes cognitive gains when Vygotskian co-construction occurs (Figure 1.3). This model is explained as follows. The organizational engagement feature involves individualization of goals, plans to optimize interactivity regarding learning, maximizing time on task and time engaged with task. There is cognitive conflict to dilute primitive cognitions and beliefs. There is scaffolding of new experiences and error management. In the model peer learning involves tutoring, support and scaffolding from a peer. The tutor needs to manage and keep the learning activities in the ZPD. This results in co-construction of new cognitive structures. During scaffolding and error management, the tutor monitors learner’s performance, detects diagnoses, corrects and manages misconceptions or errors and indirectly benefits himself also. Good communication skills are required by both tutors and tutees. Effective communication allows the tutee to be attentive while tutoring. Modeling on the part of tutor in terms of enthusiasm and confidence in turn enhances the self-confidence of the tutees as well. A sense of accountability and loyalty to each other might help to keep the pair motivated and on-task. These sub-processes feed into a larger domain where through the processes of accretion (extending current capabilities), re-tuning (modifying current capabilities), and restructuring (rebuilding new understanding) inter-subjective cognitive co-construction takes place. They say that these processes are somewhat similar to Piagetian concepts of assimilation and accommodation. Peer learning facilitates sustained practices, leading to consolidation, fluency and automaticity of core skills. Much of this might occur implicitly, i.e., without the tutor or tutee being fully aware of what is happening. As this occurs, both tutor and tutee give feedback to each other, implicitly and/ or explicitly. As the learning relationships develop, both tutor and tutee become more able to monitor and regulate the effectiveness of their own learning strategies. Thus there develops self-monitoring and self-regulation. This leads to gain in meta-cognitive ability which finally makes the learners to understand what they know, why they know and how they know it (Woolfolk, 2001). The tutor’s involvement in the peer learning process helps the tutor (through enhanced meta-cognition) in
Learning in iterative cycles: Surface → Strategic → Deep/Declarative → Procedural → Conditional

Figure 1.3: Theoretical Model of Peer Learning (Source: Topping & Ehly, 1998)
exchanging information between the long-term memory and the working memory (Eggen & Kauchak, 1997). Through this model, Topping and Ehly have drawn the conclusion that the process of cognitive development is not actually a linear model rather a continuous iterative process. The affective and cognitive outcomes again go back to the originating sub-processes forming a continuous iterative process and a virtuous circle. As the peer relationship develops, learning moves from the surface level to the strategic and on to the deep/declarative levels and then to procedural and conditional levels.

Despite the apparent differences between Piagetian and Vygotskian peer learning theories, both of them require peer interaction. Both the theories have one thing in common and that is the learning takes place through assimilation and accommodation process and social interaction would help in giving the best results.

1.3.3. Effects of PALS

Based on the empirical reviews of the literature it is suggested that peer-assisted programmes seem to produce both educational and psychological benefits.

a) Effects of PALS on Academic Growth

Based on the concept of peer tutoring, PALS has shown significant gains in academic areas like reading, language, spelling, writing, mathematics, science, history, and social studies across all age groups and diverse needs. Lloyd et al. (1998) suggested that PALS seems to produce benefits across all age groups, within specific curricular areas and across diverse needs like children requiring special education. Overall, the findings suggested that PALS meets the criteria for appropriate and effective educational practice (Peters & Heron, 1993). Finlay and Faulkner (2005) also found the academic benefits of PALS in their study. Playford et al. (1999) reported success when peer-assisted study programmes were introduced in science, economics and business subjects. Researches on peer-tutoring has indicated positive effects on the academic performance of students in elementary, middle, and high school (grades K-12) (Falk & Wehby, 2001; Okilwa & Shelby, 2010; Spencer & Scruggs, 2003; Sutherland & Snyder, 2007). Dobbie and Joyce (2008) in their qualitative study found that when PALS was implemented in several
accounting units, there generated significant academic and non-academic benefits for all those involved.

Pedagogical advantages of PALS for students with LD also exist. First, PALS increases time on academic engagement, i.e., rather than passive participation in reading (e.g., listening to the teacher read), PALS ensures active participation in reading (Delquadri et al., 1986; Simmons et al., 1995). This is the most prerequisite for students with LD, an element typically lacking in instruction for them (Limbrick, McNaughton, & Glynn, 1985). Second, because of the one-to-one nature of peer tutoring, PALS increases opportunities for responding (Delquadri et al., 1986), receiving feedback (Greenwood, Carta, Kamps & Hall, 1988).

Students with LD are frequently described as passive readers with limited reading behaviours (Wood & Algozzine, 1994). They lack specific skills in analyzing reading tasks, apprehending about the text, deriving meaning for reading, and overcoming obstacles encountered when reading (Wood & Algozinne, 1994). By contrast, students with strong reading skills are described as active learners. Since most of the PALS activities have been applied on skilled readers for their strategic reading efficacy, PALS should provide specific strategic methods for improving reading performance of students with learning disabilities.

PALS has proved to be valuable for students with Emotional Disorders (ED) too for enhancing their academic functioning (Ryan et al., 2004; Spencer et al., 2009; Bowman-Perott, 2009; Bowman-Perott et al., 2007; Harper, Maheady, Mallette, & Karnes, 1999; Spencer, 2006; Tournaki & Criscitiello, 2003; Babyak, Koorland, & Mathes, 2000; Falk & Wehby, 2001; Wehby, Falk, Barton-Arwood, Lane, & Cooley, 2003; Wehby, Lane, & Falk, 2005). Researches also suggest that PALS programmes has shown positive effects on the basic skills instruction and practice across all academic content areas but not with those requiring critical thinking skills (Okilwa & Shelby, 2010). Peer tutoring has been effective in improving student reading accuracy; greater academic gains when compared to teacher-led instruction (Bowman et al., 2007; Falk & Wehby, 2001; Fuchs et al., 1997; Kamps, Barbetta, Leonard, & Delquadri, 1994).
For students of Chemistry also benefits of peer assisted learning have been found (Coe et al., 1999). PALS has played its role in medical education as well. Glynn et al. (2006) in their study on medicine regarding PAL programme found that the learning environment was positive.

As peer assisted learning (PAL) has been explained in terms of the development of knowledge and skill through active participation and cooperation of equal status and matched companions. It is a cost-effective programme as well. Both the learner and the tutor feel more relaxed, comfortable and confident during the session. Communication and learning take place freely. The National Reading Panel (National Institute of Child Health and Human Development, 2000) has laid down that the effective reading programmes for all learners should include instruction in phonemic awareness, phonics, fluency, and comprehension. All these elements are present in PALS.

Though PALS has been proved beneficial for the overall academic growth, but it has shown its dominant appearance in the field of reading and mathematics.

(i) PALS and Reading

Five pedagogical reasons exist for examining the use of PALS language learning. First, during PALS students spend time reading aloud from text or discussing text; therefore, PALS provides more opportunities to practice language than do traditional methods (Coelho, 1994; Long & Porter, 1985). Second, PALS retelling, summarization and prediction activities lead to higher order language skills necessary for language proficiency (Coelho, 1994; Long & Porter, 1985). Third, PALS considers learners of different proficiency levels in reading and accordingly give them the text for reading, thereby allowing for the individualization of instruction. Fourth, because students are given corrective feedback by their peer tutor and are allowed to revise their answers when needed, PALS affords students to open themselves through a learning task without being hesitant to be accurate in their response (Gersten, Baker, & Marks, 1998). Finally, PALS utilizes collaborative partners and teams as well as a motivational point system; therefore, PALS provides a positive affective climate and motivates students to become proficient in reading (Long & Porter, 1985).
(ii) PALS and Mathematics

PALS has also proved its efficiency in improving achievement and attitude towards mathematics among diverse students. The students work together to practice important foundation mathematical skills. PALS Math is a 16 to 18 week programme designed to supplement the core mathematics programme. Lessons range from 20- 30 minutes and are delivered either twice or three times a week. There are three PALS Math programmes available for Kindergarten, Grade 1 and Grades 2- 6. PALS Math procedures capitalize on the use of peer as tutors to provide frequent verbal interactions and feedback on student mathematics performance. Through a series of structured activities, student pairs work together to complete a series of foundational mathematical tasks that improve computation skills, math readiness and overall interest in math (Calhoon & Fuchs, 2003). Many researchers have utilized PALS to examine its effects on diverse learners with mathematical needs (Fuchs et al., 1995 a; Fuchs et al., 1997; Fuchs et al., 2002). Calhoon & Fuchs (2003) in their study examined the effects of peer assisted learning strategies (PALS) and curriculum- based measurement (CBM) on the mathematics performance of secondary students with disabilities. PALS/CBM students improved their computation math skills significantly more than control students, but no significant difference was found on concepts/ application math skills. It was found to be helpful and motivating in increasing mathematics skills. Atkins et al. (2005) examined the success of a PAL-based mathematics among undergraduate students and reported that overall the programme helped the students to obtain higher marks in their assessments as well as a greater in-depth understanding of mathematics topics. Nilsson, Luchinskaya and Nilsson (2010) in their research study explored the implementation of peer-tutoring system in mathematics and physics in two contrasting settings. The research endorses the use of PAL in different educational settings.

b) Effects of PALS on Psychological Domain

Research suggests that PAL programmes can produce significant academic and non-academic benefits for students and PAL leaders (Ginsburg-Block, Rohrberk & Fantuzzo, 2006; Tariq, 2005; Atkins et al., 2005; Playford et al., 1999). PAL programmes may also be helpful in areas such as social integration. PALS not only provide the condition to
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ehance academic skills but also foster friendships with their peers. As mentioned earlier, such factors can have significant effects on academic achievement.

Students with emotional disorder (ED) present a variety of characteristics and factors that impact their ability to make academic and behavioural progress (Corzine, 2012). For students with Emotional Behavioural Disorder (EBD), peer tutoring enhances reduction in disruptive behaviours and an increase in self-confidence. Providing an EBD student the opportunity to participate as a tutor within the tutor tutee relationship leads to improved self-confidence and social interaction (Bos & Vaughn, 1998; Fulk & King, 2001; Greenwood, Carta, & Hall, 1988). For classrooms in which behavioural problems are an important issue, peer monitoring can be effective. With peer monitoring, peers observe and record data on a variety of behaviours. Students assigned to a peer for observation record data on specific behaviours and can work toward decreasing inappropriate behaviours by setting goals with the peer. Monitors can work in pairs with each monitoring the other on a specific behaviour, and then reinforcing each other for appropriate behaviour. Thus, the benefits of peer tutoring for students—regardless of disability or functioning—are: (a) higher academic achievement; (b) improved relationships with peers; (c) improved personal and social development; and (d) increased motivation (Bos & Vaughn, 1998; Fuchs, Fuchs, & Burish, 2000; Topping, 2001).

Fuchs et al. (2002) in their study indicated that students with learning disabilities in PALS classes enjoyed greater social acceptance. PALS has social, as well as academic, benefits. While it appears that PALS can help students achieve significant academic gains, there are also beneficial non-academic outcomes to attending such programmes. These outcomes include social development, self-concept and positive changes in attitude (Ginsburg-Block, Fantuzzo & Rohrbeck, 2006; Fantuzzo & Ginsburg-Block, 1998). This is important when we consider findings from research studies that have shown that links exist between academic achievement and factors such as self-esteem, self-concept, friendship and social skills (Eccles, Roeser, Wigfield & Freedman-Doan, 1999; Parker, Rubin, Price & DeRosier, 1995). A recent meta-analysis examining the socio-emotional outcomes of PAL interventions with elementary school students found that such programmes can result in positive social, self-concept and behavioral outcomes. Furthermore, significant positive associations were established between these
social and self-concept outcomes and students’ academic achievement (Ginsburg-Block et al., 2006). Tariq’s (2005) study examined the feedback on PAL from bioscience undergraduates. The study found that the majority of students not only reported PAL to be a valuable and positive learning experience (80%), but that many students also found the experience to be confidence building (69%). By the end of the programme, 74% of the students felt more confident, and 82% felt more knowledgeable in regards to their numerical and problem-solving abilities.

Without appropriate reading interventions, the vast majority of these students are destined to suffer serious academic problems arising from reading difficulties. Fortunately, recent research has made it possible to prevent the emergence of early word-level reading difficulties in many students with phonologically based reading difficulties.

1.4. Computer Assisted Instruction (CAI)

In the last twenty years, computers have become a part and parcel of our life. We are using one or the other form of microchip technology every day. There is no doubt that computer technology has become incorporated into our school systems and has become a pervasive tool toward optimizing student learning. Computer-assisted instruction (CAI) in any form whether computer-assisted learning (CAL), or computer-based instruction (CBI) has provided a supplemental instructional method in schools. CAI is used to improve student academic achievement including reading. CAI programmes were first developed over two decades ago. We can define CAI as the instruction or remediation presented on a computer. This CAI has been developed from the principles of programmed instruction. It is a form of individualized instruction. CAI programmes enhance teacher instruction in several ways. They use both the audio-visual mode thereby, are interactive and explain concepts through attractive animation, sound, and demonstration. They allow students to progress at their own pace and work individually or in a group. Computers provide immediate feedback regarding student’s activities and demonstrate the correct response also. Many researchers have called CAI to be the reflections of good teachers teaching in the classroom (Kulik, Bangert, & Williams, 1983) because they tutor through drill and practice, diagnose and treat problems, keep
records of student progress and present learning material through audio-visual mode or print form.

Association for Education Communications and Technology (1977) has defined computer-assisted instruction (CAI) as a method of instruction in which the computer is used to instruct the student and where the computer contains the instruction which is designed to teach, guide, and test the student until a desired level of proficiency is attained.

According to the Association for Education Communications and Technology (1977), “CAI can be defined as a method of instruction which is designed to tutor, guide, and assess students until they attain a desired level of proficiency.” The effectiveness of CAI can be either academic (e.g. achievement) or non-academic (e.g. learning motivation) outcomes, or efficiency (e.g. reduced learning time), or cost-effectiveness. Various forms of computer programmes incorporate different features. Earlier CAI was related to “drill-and practice” programmes (Cognition and Technology Group at Vanderbilt, 1996) whereas some programmes like CAL includes more sophisticated tutorial instruction (Wright & Marsh, 1999-2000), some include record keeping and management systems like Integrated Learning Systems (ILS). Many studies have been conducted to find out the efficacy of CAI in instructing students. However, very few studies have been conducted to determine the effectiveness of CAI in regard to instruct reading disabled students. Initially CAI programmes were used primarily for the reinforcement purposes but with the passage of time CAI were being used for instructing students in the classroom and then came more sophisticated CAI programmes to teach students with disabilities. CAI improves instruction for students with disabilities because of the aforesaid mentioned utilities. Through challenging and exciting programmes, CAI enhances the competitive and motivating levels of students with disabilities and leads to increased scores. Since computer moves at the students’ pace and usually does not move ahead until the students attain the proficiency, the students master the skill. Taking into consideration differential needs of different types of learners, the programmes provide differentiated lessons for students who are at risk, average, or gifted.
The origin of CAI can be elucidated in two different stages. In the first stage, it was developed as a small commercial computer in 1951 and around 1961 PLATO (Programmed Logic for Automatic Teaching Operations) was developed. The second stage of development in CAI had taken place when computerized tutorials in arithmetic and reading for elementary school children were developed by Patrick Suppes (Suppes, Groen, & Schlag-Reg, 1966), the father of CAI development.

Goldberg and Sherwood (1983) presented a classification system for computer use that was more student oriented. The five areas are: (1) learning with computers (2) learning about thinking with computers (3) learning from computers (4) managing learning with computers (5) learning about computers. In this model of computer use, only managing learning with computers is teacher oriented. Amongst this the most relevant to this study is learning from computers. Learning from computers explains that the computer is used as a means for transmitting specific subject matter, like reading. The computer presents the learning materials or activities for the students to respond. Though the information flow is from computer to the student, the activities and learning sessions go on depending upon the student’s understanding and receptiveness of the subject matter. The computer retains records of the student’s progress and thus monitors the progress of the student.

CAI programmes reinforce teacher instructions only when they are routinely implemented (Hall et al., 2000; Hasselbring et al., 1988). Taking into consideration the needs, interests, proclivities, current knowledge, and learning styles of the students, CAI favours individualization of the learning process. CAI programmes incorporate tutorials, drill and practice, greater student interaction, more information storage, simulation/interactive thinking, word processing, conferencing and Integrated Learning Systems (Schacter, 1999). Since CAI programmes affect cognitive processes and increase motivation, they enhance learning. Following are the mechanisms by which computer programmes facilitate this learning (Traynor, 2003):

**Personalizing information:** When any is associated with personal information CAI allows increasing learner interest in that given tasks (Padma and Ross, 1987) as the new information can be more easily integrated into already the existing schema. For example,
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if a student’s name or other familiar contexts appear in a concept then that new information can be easily integrated into the existing schema as the personal information associated with the problem increases the internal logic and organization of the material (Anderson, 1984; Ausubel, 1968; Mayer, 1975; Rumelhart & Ortony, 1977). The learner will easily understand that concept.

**Animating objects:** When the objects are presented in animated forms to explain any concept, it explains the concept very easily by decreasing cognitive load on the learner’s memory. For example to explain Newton’s Universal Law of Gravitation, apple falling from the tree would allow the learner to perform search and recognition processes and to make more informational relationships (Reiber, 1991).

**Practice activities incorporating challenges and curiosity:** By providing activities that are challenging stimulate curiosity and thus increase motivation (Malone, 1981) thereby leading to personal satisfaction, competitiveness, relevance, and enhancement of long term learning (Keller & Suzuki, 1988; Kinzie, 1990).

**Fantasy context:** Involvement in fantasy facilitates engagement and is intrinsically motivating thereby leads to increased learning (Parker & Lepper, 1992; Malone, 1981; Fein, 1981; Singer, 1977).

**Choice over learner’s own learning:** Providing students with choice over their own learning provides learner to control learning at their own pace and choice, which leads to increased motivation and positive attitudes and thus increases learning. This is learner controlled instruction (Kinzie, Sullivan & Berdel, 1988; Fry, 1972; Hurlock, Lahey, & McCann, 1974). Making choices in an activity with personal meaning and intrinsic interest affects certain outcomes thus making the individual feels competent and self-determining (DeCharms, 1968; Lepper, 1985). Further when individuals are given feedbacks regarding their performance on certain tasks, learner control seems to be instructionally effective (Tennyson, 1980, 1981).

Though there are many features that incorporate CAI but the most important ones are simulation/games, tutorial and drill and practice. They are explained as under:
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**Simulation/Games:** Simulation is the imitation of a real-world process which cannot be brought to the class-rooms (real or imaginary). It is considered the most powerful applications of educational computing.

**Tutorial:** Tutorials are the instructions to the students and they are imparted in the same way as the lectures are given in the class except that they are interactive.

**Drill and Practice:** In CAI, drill and practice means providing rigorous practice and exercise on any topic of learning like solving mathematical problems. There will be reinforcement and feedback but no detailed explanation. Thus the learning is enhanced through appropriate opportunities to practice desired skills and receiving feedback on the performance.

Introduction of integrated learning system (ILS) has provided a fillip in the field of instructing learning. It is more specific as it contains not only the curriculum content but also an extensive record and management system. It has three main components to facilitate the management of learning by teachers (Baturo, McRobbie, Cooper, & Kidman, 1999) (1) **Substantial curriculum content:** This comprises tutorials, practice and assessment modules on the basis of student’s ability levels. (2) **A learner record system:** This maintains and updates information regarding students and their achievement records. (3) **A management system** interpret student responses for the task given, updates student records, provides choices regarding curriculum content and learning modules and provide performance feedback to students and teachers (Brown, 1997).

So, the students are expected to benefit from CAI as they learn at their own pace and convenience, the learning is better and more comfortable; they get opportunities to work with vastly superior materials and problems; there is individualized tutoring and progress record system.

1.4.1. **Advantages and Disadvantages of CAI**

As given by Wang and Chan (1995), the major advantages of CAI can be summed up as: self-pacing, re-teaching and reinforcing, personalized feedback of instruction, favourable attitude of learners toward CAI, unlimited patience on the part of CAI, multisensory
presentations, simulations, acquiring knowledge through games, motivation and reward and so on.

The major disadvantages are: lack of human interaction, restricted text displays, limited sensitivity to needs, a poor substitute for actual experience, large capital investment, usage of different commands in different CAI packages, software and hardware limitations and so on.

Despite the fact that computer based programmes have been shown to be generally effective for improving children’s reading scores, there are still doubts whether they are as effective as teachers who provide with the personal contact and the human qualities. Mioduser, et al. (2000) conducted a study which examined the unique contribution of computer based instruction to children’s learning as compared to more conventional teaching methods. The results of this study indicated that high risk children who received the reading intervention with computer materials had significantly more improvement on reading parameters Thus CAI is a more effective means of helping students who are at risk for reading difficulties. Though the research evidences the efficacy of using computer technology for literacy interventions, but different students have different learning needs. So, a lot more researches are still to be carried out to meet the diverse educational needs of the students. Taking this point into consideration, Lange et al. (2006) proposed that a combination of different types of both CAI programmes and pedagogical strategies for teaching can help the learners in acquiring learning. Different types of software incorporating reading strategies beyond the curriculum should be used to teach so as to transfer knowledge into other content areas.

1.4.2. **Role of the Teacher in CAI**

Learning can never be accomplished without teacher. No computer can replace a teacher, as teachers’ role is very important in the process of teaching-learning. But the role of the teacher has changed in CAI from the traditional method of delivering lectures to a supervisor or a guide. Here the teacher is either a computer engineer or a lesson writer or a system operator, etc.
1.5. **Traditional Classroom Teaching (TCR)**

Traditional classroom teaching is the most widely used conventional mode of teaching accepted by the society worldwide. It has been the most proven way of teaching students over the years. The whole classroom system was started with an idea of providing knowledge to students on face to face basis and it is the teacher who is the sole decision maker behind the learning process taking place within the student. The focus must be on the basics and educators are responsible to inculcate these concepts in students. So, it can be said that teacher is the controller of the learning environment. Power and responsibilities are held by the teacher and they play the role of instructor by discharging lectures and decision maker in regards to curriculum content and specific outcomes. So, in this method of teaching, students are supposed to have the “knowledge holes” that need to be filled with information. In short, the traditional teachers consider teachers to be the cause for learning to occur in students (Novak, 1998). The students master knowledge through drill and practice such as rote learning. Traditional teaching focuses on rote learning and memorization. Regularity, discipline and conventionality are the issues that need to remain in the schools. These are highly stressed by the traditionalists. Students are supposed to learn the content in the context form. (Johnson & Johnson, 1991). The basic concept of conventional teaching is the same everywhere except that it varies from culture to culture.

Tracing back the historical working of traditional education, it was basically the simple oral recitation. The teacher's primary activity was assigning and listening to the lessons through recitations. Assignment test might be given at the end of learning process. To overemphasis on verbal answers, rote memorization was adopted. Same study material was taught for different types of learners. This approach, which had been imported from Europe, dominated American education until the end of the 19th century until progressive educational system came into light.

The main advantage of traditional classroom teaching is face-to-face contact with the teacher. This contact provides more opportunities for participants to learn from each other through discussion. The major disadvantage of this type of teaching is time constraints, since the material is provided only at certain times. In addition, the students
must progress through the material at the pace the teacher sets. So, the learning depends upon the teacher imparting the lesson and not on the needs and capacity of the student who is learning. The most important advantage of this method is that the message can be communicated in the most efficient and effective manner. Since the teacher and students are together to share knowledge, the level of interaction and participation is very high in this method. Other than that, there is a typical physical environment for learning since students have to come together at a particular place say the classroom and at a particular time to get the knowledge. In traditional classrooms, lesson plans are very critical. Getting the message across to students is the ultimate goal. Lecture, blackboard and chalk and talk techniques are the highlighted features of traditional classroom reading. This type of teaching basically focuses on the passive learning where students are expected to learn and repeat back information. Within the traditional classroom, teachers maintain control by making it organized and orderly in accordance with the behavioural theory of action. Rows are the typical form of seating arrangement in traditional classroom. Students are made to be seated such that they face the ‘front’ of the class. This set-up paves the way for effective behavioural management.

There are both pros and cons of this method of teaching. The positive part of this method is that teachers take on too much of responsibilities for teaching in the classroom to make sure that everything they know should be understood by the students. It is a good method because there is efficient communication between teacher and students. Teacher executes this method by teaching through the blackboard, explains the topic, asks students to copy down and makes sure that students should pay attention and listen. Thus, there is a control over the students. Disciplining and teaching students in school through this method of teaching is an effective way in building a good student with a character through ages.

There are certain disadvantages of traditional method of teaching too. Students get afraid to ask questions from their teachers. Secondly, they get bored by the same way of teaching method, i.e., writing on the blackboard and listening to the teacher while the students sit down in class and heat up their chairs. Only limited amount of information flows from lecturers to students because it depends upon the amount of knowledge acquired by the teachers. Thus, it can be said that teaching and learning flow in a linear
fashion. The traditional method of teaching consists mainly of giving lecture by the instructor and expecting students to be cognitively active but physically inactive, except for note taking. It has been found by many researchers that this type of behaviour cannot be sustained for long by many students (Cangelosi, 2003). Thus, the students are passive learners as they are not engaged actively (Steinhorst & Keeler, 1995).

Various studies have been carried out to evaluate traditional classroom instruction method. Blake, Gibson & Blackwell (2003) found that online learning is just as effective a classroom instruction. Online learning’s equality with classroom instruction is true for a variety of subjects. For example agricultural economics (Batte, Forster & Larson, 2003), government (Botsch & Botsch, 2001) and financial management (Ashkeboussi, 2001). Research also affirms many students are just as satisfied with the online experience as the traditional classroom. It is found that other mode of learning works better for basic concepts but regarding developing complex analytical skills, they are not as worth as traditional teachings are (O’ Connell, 2002).

But most of the researches now show that learners taught in contemporary style using context become better readers than traditional content learning (Sacks & Mergendoller, 1997; Eldredge, Reutzel, & Hollingsworth, 1996; Freppon, 1991). Many researchers have talked and discussed about traditional reading in their studies but only for comparison with other mode of teaching (Gallagher et al., 2005; Molaei, 2007; Stivason et al., 2008).