CHAPTER 2
REVIEW OF LITERATURE

Reading difficulties among children is a problem of global concern. Every civil society is concerned about these children. A number of remedial programmes have been used to overcome difficulties in reading. However, these programmes are not equally effective. Hence, now empirically based remedial programmes are in demand.

The scientific study of interventions for the children with RD has led to discoveries in three core areas of reading intervention. First, the focus is given on early intervention for children with RD. So that as soon as the difficulties emerge one should go for the remedial intervention. Secondly, instructional strategies should be explicitly and systematically imparted to these children. These reading interventions are found to be effective because they focus explicitly on phonemic awareness and phonics. Thirdly, teaching should involve proper “scaffolding” of learning. Scaffolding is the process by which teachers use particular conceptual, material and linguistic tools and technologies to support student learning through modeling, interacting and assessing. It is also very helpful in building reading skills of children with RD.

There are different intervention programmes that have provided promise for such students. The present review focuses on different approaches to reading interventions such as Peer Assisted Learning Strategies (PALS), Computer-Assisted Instructions (CAI) and Traditional Classroom Reading (TCR) used in the research study.

In essence, the rationale behind most early intervention is to encourage at risk children to learn the earlier understanding of phonological awareness, i.e., about sounds and features of print in time. In the past, interventions on reading disorders were characterized by serious measurement and methodological problems. Even in recent years, measurement issues continue to plague otherwise successful intervention programmes yielding positive and specific intervention effects. Transfer, generalizations and maintenance of effects are the key features in assessing the efficacy of an intervention, yet their reliable and valid measurements are of utmost concern (Lyon & Moats, 1997; Shanahan & Bart, 1995). It has also been found that when the treatment is changed, the outcome measures earlier
used in many studies earlier have not shown the same power and sensitivity. So, there are many questions that remain open regarding the best measurement for evaluating the success or failure of a given intervention.

The three instructional programmes described earlier have been examined for their comparative effectiveness on the reading skill acquisition of children with reading difficulties in the Indian school scenario. The limitations of earlier works have also been taken into consideration. Attempt has been made to examine the studies conducted so far on the above cited intervention programmes.

2.1. Peer-Assisted Learning Strategies

PALS a peer tutoring method is as an effective supplement to conventional teaching methods to promote critical reading skills and to fulfil the increasingly diverse needs of different types of students. The focus of PALS is not to teach ‘learning’ and ‘thinking skills’ to students but to inculcate these elements into the understanding of subject matter to be learned within the conducive co-operative environment of the PALS session. It has been suggested that PALS helps a student in increasing his or her 'critical thinking' (Congos et al., 1997; Garland & Gordy, 1987; Gordy & Garland, 1987; Koehler, 1995; Wilcox & Koehler, 1996). PALS incorporate an important ingredient called ‘discussion’ which is centred on understanding and critical thinking. This improves the student’s experience of their subject because small group discussions provide opportunities for peers to assist one another in their learning. This in turn may lead to the retention and achievement of students. A number of researches have been conducted on peer tutoring and PALS abroad, few empirical studies have been conducted in India in the area of peer tutoring but not specifically on PALS. Some of the research studies indicated the effectiveness of peer tutoring on academic performance (Mehra & Mondal, 2005; Singh & Singh, 2011; Gyanani, 1996).

2.1.1. PALS and Reading

To explore the field of PALS and provide direction for educators and researchers implementing PALS, a careful analysis of the PALS research literature is important. Methodologically, the literature emphasizes that in order to facilitate academic
effectiveness and achievement, PALS models should incorporate ingredients like cooperation and interdependence between pupils, accountability for the ‘self’ and ‘others’, rewards and specific training (Cohen, Kulik & Kulik, 1982; Cook, Scruggs, Mastropieri & Casto, 1985; Johnson & Johnson, 1987; Slavin, 1990, 1995; Rohrbeck, Ginsberg- Block, Fantuzzo & Miller, 2003). PALS intervention programmes not only enhance critical thinking and learning of the learners but also appear to contribute to the creation, development and sustenance of appropriate social, behavioural and interpersonal responses.

Different learners have different needs regarding reading. To enhance the reading achievement of different learner types, particularly low-achieving students, different studies have been carried out by different researchers. Mathes & Fuchs (1993) in their study on learning disabled students found a significant difference on words read correctly by the sustained group using PALS outperforming the control group. Analysis indicated that students in the sustained reading group had been in special education classes for fewer years than students in the repeated reading group or the control group.

In another study conducted by Simmons et al. (1994), it was found that there was a significant overall difference between treatment (PALS) and control group on CRAB (Comprehensive Reading Assignment Battery) scores, but no significant interaction effect for the treatment group by learner type (learning – disabled versus low – performing versus average achieving students).

Fuchs et al. (1997) conducted another study and reported significant results on words read correctly, questions answered correctly and number of items correctly replaced in a maze-based activity. Scores among students in PALS classrooms, averaged across student type, was greater than among students in no-PALS classes.

Gyanani (1996) examined the effect of peer tutoring on the academic performance in terms of spellings and behaviour modification of intermediate college students. In the first experiment, students were divided into small groups where peers help each other in learning spellings and they were tested after duration of 10 minutes. In the second experiment, students were asked to learn spellings on their own without any help. Results showed that peer tutoring procedure was more effective in increasing accuracy on
spellings tests. It was asserted that the peer-tutoring method has several practical advantages. It reduces disruptive behaviour, increases attentive behaviour, and consequently improves students' academic performance.

In another study, Fuchs et al. (2001a) randomly assigned 33 classrooms to three groups: control, phonological awareness training, and phonological awareness training with the K-PALS decoding activities. After approximately twenty weeks of intervention, the phonological awareness group and the phonological awareness with K-PALS group statistically significantly outperformed controls on measures of phonological awareness. Moreover, the K-PALS group statistically significantly outperformed the other two groups on measures of beginning reading skill.

In yet another study on 1st Graders, Fuchs et al. (2001b) randomly assigned 33 classrooms to one of three groups: First Grade PALS without fluency activities, First Grade PALS with fluency activities, and control. After twenty weeks of intervention, students in both PALS groups statistically significantly outperformed controls on phonological awareness and alphabetic measures. Only the students who participated in the PALS fluency activities outperformed controls on measures of fluency and comprehension. In this research also the benefits of First Grade PALS does not get affected by the learner type (low-, average-, or high-performing), disability, or type of school.

Calhoon et al. (2007) examined the efficacy of a PALS reading programme on phonological and reading fluency skills of first graders. There was one treatment condition with peer-assisted learning strategies (PALS) programme or a control condition. Reading fluency measures showed statistically significant differences between the two conditions thus favoring PALS on phoneme segmentation and nonsense word fluency. Additionally, for different ethnic groups, i.e., Hispanic and non-Hispanic, the results revealed a different pattern of response to PALS intervention. Teachers and students viewed PALS as beneficial in social domain too.

Overall, the above findings suggest that PALS employing peer tutoring is an effective pedagogic practice to facilitate reading achievements. There are still many research
studies that have been conducted to examine the effectiveness of PALS as a method of intervention. Some of them have been critically evaluated.

(a) PALS as an Adjunct Therapy

Many researchers have used it as an adjunct to other forms of intervention. PALS has proved its effectiveness when used as a supplement to regular reading programme. The present review incorporates the major researches in the field where PALS has been used along with some other supportive combination.

A research was carried out by Simmons et al. (1995) to evaluate the effects of PALS along with other teaching method. By combining explicit teaching with “peer tutoring” effects were seen on the reading achievement of non-disabled low performing and learning disabled students in classrooms. The sample consisted of 44 learning-disabled students and 24 low-performing students from 2nd to 5th grade. The study was conducted over 16 weeks. Teachers were randomly assigned to experimental and control groups. There were two experimental groups: Explicit Teaching involving teacher presentation, guided practice, and independent practice sessions, Explicit Teaching plus Peer tutoring (teacher-nominated classroom peers) and the control group. There were no significant demographic differences among teachers in the three groups, but pre-tests indicated that students in the control group had significantly higher IQs than students in the Explicit Teaching groups. Students outcomes were assessed using the Direct Observation of Behavior (DOB) during Instruction, Comprehensive Reading Assessment Battery (CRAB) and Stanford Achievement Test (SAT) to assess reading comprehension.

The findings showed PALS to be an important supplement to teaching. In this study PALS not only increased the quality of instruction but contributed to maximize peers potential. It was beneficial on both academic and social fronts.

One issue to consider is that the teachers selected students having differing performance levels from their classes for inclusion in the research sample. Although the strength of the randomized control designs compensated for the student-selection strategy, the possibility of sample and selection bias is there. Secondly, the result findings require quantification of the extent to which PALS work. It is to be found out if PALS alone
works or in combination of some other methods to fulfil the student’s needs. The generalization of these findings is also a problem as it becomes difficult to determine whether student’s behavioral progress is related to a high quality pedagogic approach or to the peer-peer experience.

In another study Mathes and Babyak (2001) found if PALS along with other method could enhance the reading skills. They studied First- Grade PALS in a medium – sized school. Thirty First-Grade teachers from five schools were randomly assigned to treatment or control groups, including ten teachers to a PALS group, ten teachers to PALS plus mini – lessons (mini lessons included content of PALS using teacher coaches) group, and ten teachers to a control group. This research was done to replicate the findings of the previous research examining the efficacy of First-Grade Peer-Assisted Literacy Strategies (First-Grade PALS) with children of different achievement levels in general education classrooms. From within each participating classroom, teachers selected three students, who were considered low, average, and high performing on the basis of one – minute oral reading assessment. Sixty one students from the PALS group, 20 students from the PALS plus mini-lessons group and 49 students from the control group were assessed. The study took place 3 times a week for 14 weeks. During First-Grade PALS, all students within a class were paired with one other to form dyads. They were to practice phonological awareness, phonological recoding and reading of connected text and to make prediction and summarization. The skills- focused mini-lessons contained the same contents as First-Grade PALS and were designed to provide additional instruction and integrated practice of the orthophonemic elements of English text. Results indicated that First-Grade PALS, on average, enhanced reading performance of students both in terms of statistical significance and in terms of educational relevance, although not equally for all learner types. In case of low achieving students, there are positive changes on word identification, word attack and basic skills from pre test to post test, with both PALS & PALS + Mini Lessons groups scoring higher than the control group but not significantly different from each other. No differences amongst groups on comprehension test were found.

In this study, since the teachers participated, there it becomes quite questionable how generalizable the study results may be because of the presence of selection bias. The
study is carried out on normal students and not on special needs students. In this study though the result suggested that there are some benefits to students who participated in the mini lessons group but the true impact of mini lessons are limited because teachers resisted implementing these lessons. Had there been research trainees or researchers in their place, the resistance could be avoided and the research result could be more specific. No sociability factors or behavioural attitudes were studied in this research study. There was no follow-up to see the long term effect of the intervention.

In yet another study by Mathes et al. (2001), a 16 week PALS programme was assessed to find its efficacy alone or in combination with some other teaching instruction. This study included 36 teachers and 183 first graders from eight schools. Children’s oral reading scores were rank ordered to designate high, average and low-- students. There were 118 low-achieving, 33 average-achieving and 32 high-achieving students. Teachers were randomly assigned to participate in PALS (12 teachers), PALS plus computer assisted instruction (12 teachers; eight to ten hours of phonological awareness instruction via computer were added; implemented for only low achieving students) or a control group (12 teachers). Baseline comparisons indicated no significant differences between treatment and control groups on demographic variables. The results indicated that low performing students of both PALS and PALS + CAI demonstrated greater positive changes between pre-test and post test than control group on Woodcock Reading Mastery Test (WRMT), Test of Word Reading Efficiency (TOWRE) test of non word efficiency, Comprehensive Test of Phonological Processes (CTOPP), Test of Early Reading Ability (TERA-2) but no differences were noted among the PALS and PALS + CAI on WRMT test, TOWRE test of word efficiency and TERA – 2.

For average and high – achieving students, there was no significant effects on any of the test. So, the results indicated that First-grade PALS enhanced reading performance both in terms of statistical significance and in terms of educational relevance, although not equally for all learner types.

The first issue here is again the participation of teachers of the concerned schools undertaken for research studies. This raises the question of biasness on the part of teachers for their own students. Secondly, the study was conducted on normal readers.
Had it been done on learning disabled, the results would have moved in another direction, thus showing the authenticity and applicability of PALS universally. The teachers were randomly assigned and not the students.

Stein et al. (2008) included 3,171 kindergarteners from 67 schools in their study to find the effective of PALS and other teaching instructions on reading achievement. Teachers were randomly assigned either to one of three PALS conditions that differed by the amount of training and support offered to the teacher or to the control group. It was a 20 week programme. The study took place in 67 schools in three sites over two years. Two hundred seventy nine teachers were recruited within the selected schools. Within each participating school, teachers were randomly assigned to one of the four conditions: (1) a day-long training workshop \((K-PALS)\), (2) the workshop plus two follow-up booster sessions \((K-PALS + Booster)\), (3) the workshop and booster sessions plus weekly technical assistance provided by a graduate student \((K-PALS + Booster + Helper)\), and (4) control group. The study did not report the number of teachers in each condition. These students were pretested, and 12 students were selected from each class: four children each with the lowest, highest and average reading scores. Though the consented sample included 3,171 Kindergartners and 279 teachers; the final analysis however included only 2,959 students and 259 teachers. Although the treatment conditions vary by the amount of training and support received by teachers, the \(K-PALS\) intervention was the same in all three treatment conditions. Students were paired by their teachers (stronger readers were paired with weaker readers for four to six weeks before being reorganized) and then worked through structured lessons during 35-minute sessions implemented four times per week in this study. The three activities of PALS were implemented. Teachers in the comparison group did not implement the intervention and did not receive any additional training.

All the students were pre and post tested on Rapid Letter Sounds (an alphabetic measure) Stein et al. reported statistically significant positive difference between the \(K-PALS\) group and the comparison group for each of the three \(K-PALS\) conditions (workshop, workshop plus booster, and workshop plus booster plus helper) on Rapid Letter Sounds for kindergarteners. The authors found that K- PALS had been effective in increasing student reading achievement. Analyzing data from 2 years and three sites, the results
showed that the level of on-site technical support had significant effects on reading achievement gains.

Though the study showed positive gains, there were certain issues to be discussed. Random assignment of teachers into different groups is clear but regarding students it is not clear. Then there was pre-test and post test but no follow-up. So, the long term effect of the intervention could not be ascertained. This study could be having more permanency if these lacunae would have been taken into consideration.

Rafdal et al. (2011) in their study determined the effectiveness of Kindergarten Peer-Assisted Learning Strategies (K-PALS) with different levels of supports on the reading achievements of students with disabilities. It was a replication and extension of Fuch et al. (2002) research work wherein they differed K-PALS by the amount of training and support offered to the teachers or to the control group the way Stein et al (2008) did in their research. The researchers randomly assigned 89 kindergartners from 47 classes to three groups: 21 in controls, 34 in K-PALS Level 1 (teachers received 1-day workshop), and 34 in K-PALS Level 2 (teachers received workshop plus booster sessions). Result analysis indicated that K-PALS students outperformed controls on alphabetic and oral reading measures, but the between-group differences were not due to any level of support. Teachers implemented each K-PALS session for twenty to thirty minutes four times a week for 18 weeks. Teachers created new pairs approximately after every four weeks. Teachers in the control group continued with their regular reading instructions in either a whole-class or small-group format. The first booster session focused primarily on procedural questions whereas the second booster session focused on classroom management, student motivation, and discussion about dealing with students having difficulties during K-PALS. K-PALS includes two activities: sound play pertaining to phonological awareness skills and decoding PALS. The study used a pretest/posttest control group design with random assignment of teachers to groups. The present study used a quasi-experimental design. The results indicated that K-PALS was effective for increasing initial alphabetic principle and decoding skills like word attack, spelling, and oral reading for students with disabilities. In the present study, K-PALS students did not significantly outperform controls on measures of phonological awareness and Rapid Letter Naming.
The current study included students with different types of disabilities. Different disabilities vary regarding the acquisition of early reading. So, the type of disability must be specified to make the study more focused. Small sample of kindergarteners would not be sufficient for such type of research because individual responses may vary considerably. So, larger samples could solve the issue. Regarding individual responses to K-PALS, single-case designs could be useful. Impact of booster sessions on outcomes for students with disabilities was not assessed in this study. Though the conclusion of the group analysis was that booster sessions did not add significantly to the impact of K-PALS but the analysis of individual responsiveness revealed that boosters might have successfully increased the individual responsiveness of students with disabilities to K-PALS.

In the current study the data was collected from only one site as the researchers were more interested in the efficacy of K-PALS for students with disabilities because the efficacy for this group was not as well-established as efficacy for students without disabilities. There was variation in K-PALS implementation across different sites like classrooms implementing fewer K-PALS sessions at one site than the other or the varying service delivery system, etc. Had the research comparison been done across the three sites while maintaining the pre-requisite experimental conditions, the results could have been more authentic and applicable.

(b) Fluency

Many studies have been conducted to find the efficacy of PALS on phonological awareness, decoding and fluency. Some of the highlighted studies are cited here in this section.

To explore the benefits and significance of PALS on fluency, Mathes et al. (1998) studied First Grade PALS in 20 classes from six schools in an urban school. Within each of the 20 classrooms teachers identified five students based on reading test performance: three lowest achieving students, one average achieving student and one high–achieving student. First-Grade PALS helped teachers (a) By focussing instructions through peer mediation so that students could more actively involved in the learning process, (b) by including phonological and alphabetic skills into the decoding of words in connected
text, and (c) by providing extensive and repeated exposure to a variety of children’s literature. 96 first–grade students participated. Data collected included (a) phonological awareness and reading fluency data and (b) pre- and post–measures of concepts of print, decoding, fluency, and comprehension. At baseline, a statistically significant difference was found between the control and treatment groups for low–achieving students on average words read per minute and on words on the Comprehensive Reading Achievement Battery (CRAB) read correctly in three minutes, with the control group having better scores than the PALS group.

Results indicated that all learner types were positively affected by participation in First–Grade PALS, with the greatest gains indicated for low–achieving students. The results of this study indicated the positive results in phonological awareness and reading fluency, integrating phonological and alphabetic skills. But in this study, PALS was conducted on normal readers and not on learning/reading disabled. It was only assumed that all the children who were selected were having average or above average I.Q. So, biasness on the part of experimenters was there. No post test assessment was conducted as a result the long term affects after intervention could not be indicated. An extended A-B design like A-B-A-B design would have been helpful in getting more concrete results.

In this study also, issue regarding the selection of students by their own teachers is very critical. Though randomized control designs were used to compensate this problem, the possibility of sample bias is there. So, the findings cannot be generalized and long-term effects cannot be ascertained. The research did not quantify the extent to which rewards/incentives should be provided to increase conduct and whether the dyadic environment had increased external motivation or decreased internal motivation (Koestner et al., 1996).

In another study, McMaster et al. (2005) examined the effects of PALS and modified PALS compared to one-on-one adult tutoring on fluency. First graders (N = 323) participated in the PALS. Sixty six children in eight schools were identified as unresponsive to PALS. Unresponsive 66 students were then assigned randomly to one of three treatments and were given treatments for seven weeks. The intervention was
delivered one-on-one by peers in the PALS and modified PALS conditions and one-on-one by up to eight adult tutors in the adult-tutoring condition. Modified PALS activities were similar to PALS; however, they incorporated three important modifications. The comparative effectiveness of the three treatments was assessed on the basis of the performance on phonological awareness and reading-related measures. Findings showed that one-to-one tutoring was the most promising for reducing unresponsiveness. McMaster et al. reported no statistically significant difference between the PALS group and the comparison group of first graders on the alphabetic outcomes: Blending, Rapid Letter Naming, Rapid Letter Sound, Word Attack, Word Identification, Spelling, and Segmentation. The study also reported a negative mean difference between the PALS group and the comparison group on the Comprehension subtest of CRAB test for students in grade 1. In this study, the intervention was implemented three times a week for 35 minutes each session for 13 weeks. The comparison group received one-on-one tutoring from trained adult research assistants. Adult tutoring took place three times a week, 35 minutes each session, for 13 weeks, and covered the same topics as in the two PALS conditions. The tutoring session gave greater attention to skill mastery and the student’s specific needs. Results also showed effect sizes favouring tutoring over PALS and Modified PALS on a number of reading-related measures, and Modified PALS over PALS on Rapid Letter Sound naming, Word Attack, and comprehension. Similarly it was found that Tutoring reduced unresponsiveness by 50%, whereas the Modified PALS and PALS treatments lessened unresponsiveness by 25% and 19%, respectively. Thus, the study showed indeterminate effects. No statistically significant effects were found in fluency domain (Near-Transfer Fluency or Far-Transfer Fluency) outcomes for students in Grade 1. The evidence showed that dual discrepancy could successfully distinguish non responders from responsive at-risk and average-achieving children on reading related measures.

This study had certain limitations to be discussed. Participants were only pre-tested and post tested. There were no follow-up. Statistical analyses were relatively low powered because of the small sample size. There was no control group so as to ascertain whether the three treatments were more beneficial for unresponsive readers than more traditional classroom instruction. Since the low responders did not respond well on additional
interventions, more intense interventions should be provided by decreasing group size for instruction and/or increasing the amount of time in instruction. In this way, this study could come out with better results.

(c) Comprehension

Comprehension is considered to be a major developmental milestone in achieving reading skills. In order to examine the effects of PALS on comprehension many studies have been carried out. Some of them have been evaluated here.

To examine the effects of strategy instruction in peer-assisted learning on student reading comprehension and fluency, Fuchs et al. (1999) implemented PALS with secondary-level students and randomly assigned 18 high school remedial reading classes and special education teachers either to PALS to teach reading (N= 9 classes) or to contrast treatments (N=9 classes). Teachers implemented PALS five times every 2 weeks for 16 weeks. Contrast teachers provided reading instructions using their conventional programmes. To measure reading comprehension, Fuchs et al. (1999) used a researcher-developed test, the Comprehension Reading Assessment Battery. Students read traditional folktales.

Reading comprehension and fluency were measured in pretests and post-tests. Results indicated that, compared to contrast treatment, PALS students showed enhanced performance on reading comprehension and reported more positive beliefs about improving reading. However, PALS and contrast students grew comparably on reading fluency.

In this research study, at the end of the experiment, data from only a subset of students were used in the analysis of the effects of peer-assisted learning on reading. Teachers used a combination of the prior year’s standardized test results and professional judgment to identify the subset of students whose data would be included in the analysis, identifying students whose reading levels were between grades 2 and 6. This selection of students for inclusion into the analysis disrupted the randomization process, creating a potential bias. So, the study was assessed as a quasi-experimental design.
Though the evidence indicated that peer-assisted learning had significant positive effect on struggling high school students’ reading comprehension but because the students were not randomly assigned to the intervention, the fidelity of the research is questionable. In addition, the extent of evidence was very small, the findings have limited applicability. Further random assignment of students to the intervention is needed to strengthen the research findings. Since the same folktale was used as the outcome reading measure, generalization could be difficult so a follow-up with different text material as outcome measure would be better to assess the effectiveness of peer-assisted learning. Studying the effects of peer-assisted learning on listening comprehension would also be valuable so as to reduce reading problems.

In an extent to further explore PALS effectiveness on comprehension skill, Saenz et al. (2005) examined the effects of PALS on the reading performance of native Spanish-speaking students with learning disabilities (LD) and their low-, average-, and high-achieving classroom peers. Participants were 132 native Spanish-speaking English language learners (ELL) in Grades 3 through 6, along with their 12 reading teachers. Teachers were assigned randomly to PALS and contrast groups. PALS sessions were conducted 3 times a week for 15 weeks. Students were tested before and after treatment.

PALS students outgrew contrast students on reading comprehension, and those effects were not affected by student type. Teachers asserted about the academic and social benefits of PALS for different types of students. PALS instructions helped in increasing the overall reading achievement and social skills of students. Besides, there was an increase in the reading confidence of students also. This was the only PALS study that had examined the effects for ELL, and described effects for high achievers at Grades 3-6. Though there were strong differential gains favoring PALS across achievement categories on reading fluency and maze task measuring fluency and comprehension, but failed to achieve statistical significance.

The limitations pertaining to this study which are obvious are: First, in the entire research study, research assistants provided technical assistance both during and after the training. So, it is doubtful if the same results would have come in the technical assistance absence.
In order to clear this doubt, the effects of PALS with technical assistance and PALS without technical assistance should be seen. Second, the classrooms settings were not appropriate. The sample was entirely an ELL student population who spoke Spanish as a first language. Instead the sample should be Spanish-speaking ELL who could speak a number of different first languages.

Third, it is clear in the study that teachers were randomly assigned to two different treatment groups but whether students were also randomly assigned is not clear. This affects the external validity. Though there were differential gains for PALS but there were no statistical significance. Larger sample would help in examining the effect clearly. Utilizing larger samples would clearly indicate differential improvement between conditions or differential improvement for the different student types. Then the generalization would be possible.

2.1.2. Issues and Observations

PALS programme has come out to be a promising programme for mastering reading and mathematical skills. All the above research studies are mostly randomized control trials, which used convincing comparison groups along with statistical analyses for any pre-existing differences between the experimental and control groups. The evaluations have demonstrated that in various versions of PALS, the experiment groups have scored significantly higher than control group on reading and mathematics skills. Salient aspects of the above-quoted studies are summarized in Table 2.1.

Still there are certain issues that have turned up. In most of the studies, it was found that teachers were selecting students from their classes for inclusion in the research sample. Involvement of teachers of the same school and class shows the bias factor. The study would have been more authentic if some other researcher or person would have played the role of the teacher. Though the randomized control designs were used to compensate for this problem, still the possibility of sample bias is there.
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<th>Author year</th>
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<td>1. Simmons et al. (1995)</td>
<td>-24 Teachers and 68 students of grades 2 through 5.</td>
<td>-16 Experimental group teachers were randomly assigned to</td>
<td>-Direct observation of behavior (DOB) during instruction</td>
<td>-PAL is an important supplement to teaching modality</td>
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<td>-Lower to upper middle class SES.</td>
<td>(a) Explicit Teaching (ET)</td>
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<td>-Of the 68 Students, 44 were learning disable and 24 Low-performing</td>
<td>(b) Explicit Teaching + peer Tutoring (ET + PT)</td>
<td>-Stanford Achievement Test (SAT)</td>
<td>-PAL contributes to maximize peers potential</td>
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<td>-Woodcock word identification, word attack and passage comprehension</td>
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<td>-130 Students from First Grade</td>
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<td>-30 minutes session 3 times a week for 14 weeks.</td>
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<td>-Of 183 students, 118 were low-achieving, 33 average-achieving and 32 high-achieving.</td>
<td>(a) PALS (12 teachers)</td>
<td>-Test of Word Reading Efficiency (TOWRE) test of non word efficiency</td>
<td>-No differences between PALS and PALS+CAI on WRMT, TOWRE, CTOPP and TERA-2.</td>
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<td>(b) PALS+ Computer Assisted Instruction --CAI (12 teachers; 8 -10 hours phonological awareness instruction via CAI only foe low-achieving students)</td>
<td>-Comprehensive Test of Phonological Processes (CTOPP)</td>
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<td>(c) Control group (12 teachers)</td>
<td>-Test of Early Reading Ability (TERA-2).</td>
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<td>Author year</td>
<td>Particulars</td>
<td>Method</td>
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<td>4. Rafdal et al. (2011)</td>
<td>- 89 kindergartners from 47 classrooms.</td>
<td>- students were randomly divided into three groups: Control group (21 students) K-PALS Level 1 (34 students) K-PALS Level 2 (34 students) -classrooms assigned to: Control group (9 classes) K-PALS Level 1 (19 classes) K-PALS Level 2 (19 classes) -Pre-test/post test control group design with random assignment of teachers to groups.</td>
<td>- Measures used were Rapid Letter Naming (RLN), Rapid Letter Sound (RLS), Blending, Segmenting, Word Identification (Word ID), Word Attack, Oral Reading, and Spelling.</td>
<td>-Results indicated that K-PALS was effective for increasing initial alphabetic principle and decoding skills like Word Attack, Spelling and Oral Reading. -K-PALS students did not significantly outperform controls on measures of phonological awareness Rapid Letter Naming.</td>
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<td>5. Mathes et al. (1998)</td>
<td>-20 First Grade classes from 6 school -96 first grade students (40 low, 20 average &amp; 20 high achieving)</td>
<td>-10 classes were assigned to PALS and 10 to control group. -PALS three weekly 35 minutes session per 15 weeks. 1. Four activities: - 2. Paired reading 3. Paragraph shrinking 4. Prediction relay and 5. Story mapping -No intervention for control group.</td>
<td>-Woodcock reading mastery test: Word Identification, word attack and passage comprehension subtests. -Test of early reading ability (TERA) concepts of print -CRAB comprehensive reading assessment battery -Curriculum based measurement probes over time: -Oral reading rates and phonological awareness</td>
<td>-All learning types were positively affected by participation in first – Grade PALS, with the greatest gains for low achieving students</td>
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<td>6. Stein et al. (2008)</td>
<td>-3171 kindergartners and 279 teachers from 67 schools. -40% were Hispanic -26% were non-Hispanic White -25% were African American -5% were Asian -3% were of other ethnicities.</td>
<td>-Four 35 minutes session per week for 20 weeks on three treatment conditions: a) K-PALS b) K-PALS+ Booster c) K-PALS+ Booster+ Helper - Control Group. -668 in control group -968 in K-PALS -931 in K-PALS+ Booster -604 in K-PALS+ Booster+ Helper</td>
<td>-Alphabetic measure: Rapid Letter Sounds</td>
<td>Significant positive differences from pre-test to post test between comparison group and each of the three K-PALS conditions (K-PALS, K-PALS+ Booster, K-PALS+ Booster+ Helper) on Rapid Letter Sounds measure.</td>
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<td>Author year</td>
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<td>7. Saenz et al. (2005)</td>
<td>-132 native Spanish speaking English Language Learners (ELL) with Learning Disabilities from Grades 3 through 6. -12 Reading Teachers</td>
<td>-Two groups: PALS group Contrast group -Teachers were randomly assigned to both groups. -PALS sessions were conducted 3 times a week for 15 weeks. -Pre/post test design -Randomized Control Trial</td>
<td>- Comprehensive Reading Assessment Battery (CRAB). - Teacher and Student Questionnaires using 5-point Likert-type scale, for their opinions on the academic and social benefits of PALS for students.</td>
<td>-PALS outgrew on reading comprehension than contrast group and those effects were not affected by the learner type. -Overall increase in reading achievement, social skills and reading confidence of students with Learning Disabilities.</td>
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<td>8. Fuchs et al. (1999)</td>
<td>-18 high school remedial reading classes - Participants were from Grades 2 through 6.</td>
<td>-Two groups: PALS (N=9 classes) Conventional Contrast (N=9 classes) -5 times every 2 weeks for 16 weeks. -Pre-test/post test design</td>
<td>-Researcher developed Comprehension Reading Assessment Battery</td>
<td>-PALS had significant positive effect on struggling high school students’ reading comprehension.</td>
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<td>9. McMaster et al. (2005)</td>
<td>- 323 First Graders participated PALS programme. -66 children in 8 schools were unresponsive to PALS. -Unresponsive 66 children were then assigned randomly to three treatment groups. - Intervention programme three times a week for 35 minutes each session for 13 weeks.</td>
<td>-Three treatment groups were: - PALS - Modified PALS - One-to-one tutoring -22 students in each group. -7 weeks treatment. - Intervention in PALS and Modified PALS by peers on one-on-one basis. -Intervention in One-to-one tutoring by adult tutors on one-on-one basis.</td>
<td>-Pretest/Post test Measures: Blending, Rapid Letter Naming, Rapid Letter Sound, Word Attack, Word Identification, Spelling and Segmentation. -Only post test Measures: Near-Transfer Fluency, Far-Transfer Fluency -Monitoring Measures: Chapter tests, Dolch Probes, Non Word Fluency Probes</td>
<td>-no statistically significant difference between the PALS group and the comparison group on: Blending, Rapid Letter Naming, Rapid Letter Sound, Word Attack, Word Identification, Spelling, and Segmentation. - a negative mean difference between the PALS group and the comparison group on the Comprehension subtest of CRAB for students in grade 1.</td>
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</table>
In most of the studies there was pre-post randomized control design but follow-up was not there in many cases, so, the long term effect of the intervention implemented is questionable. Another issue which has arisen is the teacher’s participation in the research study. In many studies it was found that the teachers often volunteered to participate in the study. This raises questions about how generalizable the study results may be to other teachers who are not as eager to participate in a new programme or a research study.

Other methodological issues are related with 'self-selection bias'. This means the students who are well-motivated, or in some other way good enough to do well at studies, if attend the PAL sessions will skew research data. This is to be taken care of. Then it is not clear in the above studies to what extent PALS should be quantified to produce desirable results. Extent to which rewards /incentives should be provided in PALS intervention is again not clear. There was absence of research trainees or researchers in the above discussed studies. Lack of randomization of sample was also seen in some places. Since PALS is applicable to all learner type, it becomes difficult to establish any causal relationship in PALS research.

2.2. Computer-Assisted Instruction (CAI)

The past two decades have witnessed the digital revolution. Globally computers are prevalent everywhere and now they have made their way into school systems as well. CAI programmes use different types of instruction like drill and practice, strategy instruction, and simulation while focusing on various components of reading like pre-reading skills, word recognition, vocabulary, and comprehension.

2.2.1. Research Studies Pertaining to Reading Achievement and CAI

Though a large body of work exists pertaining to CAI, a much smaller amount of research has been dedicated to the impact of CAI on reading instructions and so a considerable debate over the effectiveness of CAI on reading ability is there. Though there are mixed reviews regarding the motivational and other features related to CAI but the educators and researchers in special education are still focusing on the positive impact of using computer technology for students with disabilities and more emphasis is
given on the studies showing direct relation between CAI and reading achievements rather than inverse relationships.

Although literature within the fields of reading instruction and CAI is limited yet there are certain landmark studies that indicate a positive link between the use of CAI and reading ability. Torgesen (1986, p. 159) stated that "computers have the capacity to deliver motivating, carefully monitored, individualized, and speed-oriented practice in concentrations far beyond those available in traditional instructional format". Schmidt et al. (1985-86) gave some reasons behind the effectiveness of CAI like secured one-to-one learning environment, individualized programmes of learning, prompt and immediate feedback, mathematical and linguistic modeling, and a multi-sensory learning environment that includes visual and auditory stimuli.

Swan, Guerrero, Mitrani and Schoener (1990) investigated an early review of CAI for its efficacy in providing basic skills remediation in maths and reading for educationally disadvantaged student populations.

While assessing the efficacy of CAI on learning and achievement, Sivin-Kachala (1998) reported that students demonstrated positive achievement in all major subject areas. Both regular and special needs children showed increased achievement in their school education. Students’ attitude toward learning and self-concept also showed the improvements. However, the level of effectiveness of CAI depends upon many parameters like the type of student population, the software used in CAI, the instructor's role, and the extent of student’s accessibility to computers.

Singhal (1999) also reported CAI to be effective on Basic Reading Skills than the traditional reading instruction. In a meta-analysis of literature pertaining to the effectiveness of CAI, Hall et al. (2000) found that 13 of 17 studies showed positive increases in student learning where CAI was utilized. Hitchcock & Noonan (2000) found CAI to be more effective method of instructing mentally disabled students over teacher-assisted instruction. The Software & Information Industry Association (2000) also described increases in reading achievement through CAI methods in the areas of phonological awareness, reading comprehension, reading vocabulary, and spelling.
Zyoud (1999) in his research study developed a Computer Assisted English language teaching program for Grade 8 Gujarati medium students and examined its effectiveness on students’ achievement in terms of vocabulary, grammar, and comprehension. Findings revealed that the computerized exercise helped the student become familiar with significant amounts of vocabulary, grammar, and comprehension because it provided effective individualized instruction.

Macaruso & Rodman (2009) conducted a study to investigate the benefits of CAI for middle-school students attending remedial reading classes. CAI programme was found to be effective in strengthening phonics word identification skills. Hitchcock & Noonan (2000) found CAI to be effective in enhancing and building academic skills in preschoolers with disabilities. There is minimal direct instruction from the teacher in case of CAI but more instructional time for the teaching to provide and the students are given practice time in a particular skill area (Hall et al., 2000).

Patel (2009) examined the effect of CAI on students’ achievement in English Grammar in different modes (only CAI, CAI with repetition, CAI with discussion). The findings revealed that the achievement of the students in English Grammar receiving CAI was found significantly higher than that of the students taught through traditional methods. Those receiving CAI with repetition and CAI with discussion were found significantly higher than the achievement of the students who were taught through traditional methods. From the three modes of the presentation of this CAI, teaching through CAI with discussion was found significantly superior in comparison to other two modes. CAI was also found to be effective in terms of the students.

Jena (2009) in his study examined the use of cognitive-behaviour therapy (CBT) and computer assisted instruction (CAI) in improving the academic skills of a child with retardation. A-B-A quasi-experimental design was used to assess the effects of intervention through 15 CBT sessions and 6 CAI sessions. The findings showed an improvement in reading errors such as guessing, omission, and pronunciation. There were improvements in eye-hand coordination, verbal memory, and expressive language. All these improvements were attributed to the improvement in information processing skills because of the use of CBT and CAI.
The design of CAI has made it possible for adapting to the different levels of instruction with exceptional children (Schmidt et al., 1985-86). Computers provide motivation to students (Hall et al., 2000). Students managing screen activities independently make them to remain on task for longer (Hitchcock & Noonan, 2000). Immediate corrective feedback to the learner’s response makes the student to practice and more learning (Hall et al., 2000). That’s why it has become an attractive and engaging learning medium. These are some of the reasons why CAI is deemed to be more effective than conventional direct teacher instruction.

There are few studies that have been carried out to evaluate the effectiveness of CAI for the children with disabilities. Besides, these studies there are certain reports that highlight the mixed or negative effects of CAI on reading achievement (Kulik, 1994; Roblyer et al., 1989; Kadiyala & Crynes, 2002; Parr, 2000; Hook, Macaruso & Jones, 2001). Some of the pertinent studies that pertain to CAI and their role in reading are been critically discussed here.

(a) CAI as Supplement to Regular Reading

A great deal of research has been conducted since the advent of computers to find its effects on student achievement, attitudes, learning rate, reading proficiency, etc. This research covers a wide range of topics and one such topic is CAI as supplement to conventional instruction.

Findings about this area have been mainly focused below.

Hall et al. (2000) summarized 17 studies in a methodical literature review on CAI as reading remediation for students with learning disabilities. The studies were evaluated by the type of computer instruction like drill and practice, strategy, simulation, etc. and type of reading intervention like pre-reading, word recognition, vocabulary/language, and comprehension/higher order thinking skills. Regarding intervention, the participants received CAI that focused on phonological and word recognition skills for, vocabulary, and meaning, or on reading comprehension and higher-order thinking skills. On an average there were 17 sessions. There were 569 subjects from Grade K-12 (from the years 1980-1997).
The findings indicated that CAI programmes when used for students with LD used drill-and-practice procedures, followed by strategy instruction, then simulation for reading. CAI reading programmes focused mainly in the areas like word recognition and reading comprehension, followed by language/vocabulary, and then pre-reading skills instruction. Students with LD receiving CAI in reading showed increased performance in reading decoding and reading comprehension.

The studies examined in this analysis pointed to several elements of a successful CAI programme. Teachers when implementing CAI as an addition to their regular reading programme were providing children with additional instruction and practice in reading. This extra reading time alone might be accountable for some of the improvements shown by children using CAI. Not the least, CAI programmes using research-based teaching strategies like elaborate feedback, opportunities to correct mistakes and rehearse the correct responses were found to be highly effective. The researchers suggested that CAI could be a powerful tool for teaching reading, but only as a part of an effective reading curriculum and not independently. CAI should be used to supplement, not replace, traditional reading instructions.

This literature review had certain important limitations. In many studies detailed information on correction procedures, study length, duration of sessions, or generalization effects were not provided. Thus, the long term effect of CAI could not be ascertained for the sample taken in this literature review.

Soe, Koki & Chang (2000) carried out another meta-analysis to see the effect of CAI on reading achievement of Grade K-12 students and revealed that CAI has positive effect on reading achievement. The literature search for this report included 33 studies (from 1982 to 1999) which were related to computer instructions and effect on reading in any form. However, only 17 studies in this meta-analysis were coded.

In reviewing the literature on CAI, several issues came into light. The 1980’s studies were only text based. There was no graphics at all. So, more of the contemporary studies were taken for the analysis. Because only 17 studies included gave the findings that CAI promoted higher reading achievement, however this finding could have moved in a different direction if there were more studies that could have been included in this meta-
analysis. There was no homogeneity in 17 studies regarding the effects of CAI on reading achievement.

Most of the studies that were included showed that CAI was used as a supplement rather than as an independent instruction. Lack of sufficient numbers of studies in this meta-analysis is a big barrier to this result. Another issue is that it says that CAI enhances reading achievement but how and to what extent is not known.

Macaruso, Hook, & McCabe (2006) examined the benefits of CAI programmes when being provided as a supplement to the regular reading instruction in 10 classes of 5 urban public schools. In this study reading performance of a large sample of first graders using the Lexia programme was compared with control students receiving similar classroom instruction but without Lexia use. The computer-assisted programme, Lexia provided strategically systematic tutorials for learning word attack. For this sample a separate set of analyses was conducted for low performing students eligible for Title I services, i.e., additional academic support provided to low achieving children. One class in each school was assigned to the experimental (treatment) group and a second class to the control group. The students came from diverse socio-cultural backgrounds. The sample consisted of 83 students in the treatment group and 84 students in the control group. Fifteen students in each group were Title I eligible. These students were identified as at-risk by their teachers. In addition, one student in each group was classified as an English as a Second Language (ESL) student. All treatment and control classes were engaged in daily reading instruction using some form of explicit phonics instruction. The treatment group received the intervention for six months. Students eligible for Title I services received an additional 30 minutes per day of academic instruction.

This study examined the benefits of CAI programmes designed to supplement regular classroom curriculum. The findings indicated that first graders who participated in the programmes made significant reading gains. Their post-test scores were slightly but not significantly greater than the post-test scores of control children. The low performing children eligible for Title I services, significantly had obtained higher post-test scores in the treatment group compared to the control group. They showed particular
benefits from participation in the treatment programme. The findings indicated that systematically delivered well-structured CAI programmes could help low performers to learn word attack strategies. The opportunities provided by the CAI programmes like self-paced activities as per the individual’s need, immediate feedback and intensive practice had helped struggling readers to progress. Overall, teachers reported high levels of satisfaction with the CAI programmes. This study clearly indicated that intensive phonics based CAI could be beneficial to low performers in the early grades. The interactive nature of CAI and activities like games provided motivational tools for learning and skill acquisition, thus contributing to the success of CAI in this study.

With all the plus points, there are certain issues that are to be addressed. One thing that is not clear in this research study is regarding the categorization of students to experimental and control groups. It is not clear whether they were randomly assigned or not. Then the setting of the study is not clear. There is no indication in the study whether it was a quasi-experiment or a true experiment. A pre-post design is there but with no follow-up, so generalization of the research findings cannot be ascertained. Since the participants belonged to diverse socio-cultural environment, feasibility of certain extraneous factors affecting the performance could be possible.

Though the CAI programme used in this study has proved to be beneficial for low performing students in reading, further research is needed to determine if this programme can prove to be beneficial for even the lowest performing children in reading or not.

In another research Moody (2007) examined effect of using CAI within an after-school tutoring programme on student reading achievement and on perceptions of after-school programmes. Myskillstutor, a CAI programme was used within teacher-directed instructional lessons and independent practice sessions. Twelve students from either third or fourth grade participated in the 4-week voluntary after-school tutoring programme with two 90 minutes tutoring sessions each week. The researcher recorded observations during each teacher-directed lesson and each student independent practice session. Third and fourth grade teachers were taking the sessions.

The influence of CAI on student reading achievement was determined by comparing student performance results on a CAI pretest and teacher-generated pretest against the
CAI generating post-test and the teacher-generated post-test. Perceptions and experiences of students while using the CAI programme were observed and documented through pre and post-opinion surveys. The post-opinion survey results were used to determine students’ perceptions about the intervention, regarding improvement in the reading skills, and comfort level while using Myskilltutor. Certain selected students’ responses were also recorded through individual interviews.

Data was collected before, during, and after the implementation of the intervention. The major goals of the study were to determine the changes that occurred in student reading achievement throughout the intervention, the experiences, preconceptions and perceptions of third and fourth grade students regarding the use of CAI to practice reading concepts.

Myskilltutor was found to be effective in improving reading skills. Before, during, and after reading interactions improved comprehension skills involving deduction and investigation. Field observations suggested that using CAI programme helped students to get acquainted with the programme without the fear of being scolded for committing mistakes. Students indicated a preference for using the CAI during teacher-directed instruction over independent student-directed practice. The CAI lessons were effective in improving reading comprehension skills. Interactions between students and teachers were greater during teacher-directed instruction than during independent practice lessons.

Certain limitations that could be observed while analyzing the study were that there was no comparison from the Myskillstutor pretest score to the post-test score due to lack of time. This limitation decreased the data availability for analysis. There were many students who could not complete the lessons assigned for the study. Eight sessions of 90 minutes tutoring were not enough to fully assess the impact of the CAI on students’ reading skills. Furthermore, technology difficulties and inadequate teacher-generated post-assessments affected the post-assessment data. Attendance might have also been a factor affecting student performance on the Myskilltutor programme.

The mean time spent on the pretest might be used as a guide for allocating time and monitoring student progression within an activity. In this study students did not spend more time on taking the quiz during post test. So, the group performance on each lesson
was not up to the mark. The percentage of overall gain was hardly 8%. So, proper time should be allocated while implementing the intervention. Another variable that might have impacted student reading achievement was the teaching styles of the teachers involved. The students participated more often when the fourth grade teacher was the tutoring instructor. Students stayed focused during her lesson and no off-task behaviors were observed. Researcher’s own participation in the research programme came out to be a big hurdle because of her off and on presence. Lastly, the findings did not ascertain its permanency. There was no follow-up, so no generalization of the results and hence lack of reliability and validity.

(b) Fluency

Fluency is an important component of oral reading. Both practice and support are essential to the development of fluent reading. For this many studies have been conducted to examine the effects of CAI on fluency. Some pertinent studies have been discussed below.

Watson and Hempenstall (2008) conducted a study to evaluate a parent delivered; computer based beginning reading programme, Funnix, on an experimental group of Kindergarten and Grade 1 students. They were expected to produce statistically significant improvements in phonemic awareness, letter-sound fluency, non-word decoding skills, and oral reading fluency. There were 31 participants, aged from 4 years to 7 years from 18 primary schools. Sixteen students were enrolled in Kindergarten and 15 in Grade 1. The reading ability was measured using: Texas Primary Reading Inventory, the Comprehensive Test of Phonological Processing (CTOPP), the Woodcock Test of Reading Mastery – Revised, the Revised Brigance Comprehensive Inventory of Basic Skills, and Project Aim. Statistically significant treatment effects were found for Kindergarteners in the intervention group on letter-sound fluency, oral reading fluency, non-word decoding, and phonemic awareness skills than did comparison Kindergarteners. Grade 1 students in the intervention group demonstrated significant improvements over time on letter-sound fluency, letter-name knowledge, non-word decoding and oral reading fluency; but not for Grade 1 comparison group. It was
concluded that Kindergarteners gained the most benefits, and that at risk students may represent a fruitful target sample.

Besides the positive findings, certain confounding findings were also reported. The comparison Kindergarteners also achieved large effect sizes on these four measures, and even made significantly greater improvements over time on the letter-name knowledge variable than did the experimental Kindergarteners. These findings suggest the influence of factors outside of the intervention on student progress. There were no statistically significant treatment effects for Grade 1 students completing Funmix when compared to the comparison group. From these confounding results, it can be concluded that there was the influence of other variables on reading performance. Another point was that the effect sizes for the experimental group were all substantially above a standard deviation, a result unusual in educational research. A possibility is that the parents of children in the comparison group, who were more committed for their child’s reading progress, provided a more supportive environment or even equally effective reading instruction during this phase.

The sample was not a true representative of the wider population because of the participant’s drop. Those who remained in the programme were children with average reading abilities at pretest. There was no random allocation of students to the experimental and control groups. They were allocated on a first come first served basis. The small sample size led to pretest differences between the two groups. These features affected the internal validity of the study. The small sample size implied that the sample should not be considered indicative of the average population. Thus, results could not be generalized.

Torgesen et al. (2010) evaluated the effectiveness of two computer programmes on students with reading disabilities. The first programme was Read, Write, and Type (RWT) in which specific teacher lessons were developed so that the students could prepare for learning and practice on a computer. In another programme, Lindamood Phoneme Sequencing (LIPS) was developed to support the instruction provided in a programme to guide teacher-led instruction for students with dyslexia. Both programmes provided explicit and systematic support for the development of phonemic awareness, phonemic decoding and encoding, and text reading accuracy. Although both programmes involved reading and understanding meaningful text as part of the instruction and
practice, this emphasis was greater in the RWT programme than the LIPS programme as implemented in this study.

The RWT programme supported direct teaching phonemes for the spellings thus supporting decoding and encoding activities whereas the LIPS programme, had given stress on early reading instruction by developing oral motor awareness. The purpose of this study was to see the differences in instructional impact between the two approaches to early intervention. The sample consisted of 112 students from first grade in three elementary schools. Interventions were provided for two years. Those children were randomly assigned within schools to one of three groups: 36 students to Read Write and Type (RWT), 36 students to Lindamood Phoneme Sequencing Programme for Reading, Spelling, and Speech (LIPS), and 40 students to control group. At follow-up, one year after the end of instruction, the number of participating students was 108, with 34, 35, and 39 students participating in the RWT, LIPS, and control conditions, respectively. Children assigned to the Control condition received no instruction by their teachers although many of these children received special support. A pretest-post-test and follow-up (post 2) design was followed. Students in the control condition received only three of the pretests that were included in the initial screening; however, they received all of the tests that were given at post-test (post) and follow-up (post2).

There were no statistically significant differences among intervention groups on the pretest, post-test or one-year follow-up. It is apparent that the introduction of intensive CAI would reduce the number of children with poor reading skills. The students who received the interventions continued to do better than those in the control group on all the variables, but the differences were statistically reliable only for phonemic decoding accuracy/fluency, rapid naming and spelling. Although reading outcomes for students who received the LIPS intervention were slightly stronger than for students receiving the RWT intervention, but statistically not reliable. In contrast, students who received the computer supported interventions in this study showed reliably stronger outcomes in phonological awareness, rapid naming, phonemic decoding, word reading accuracy/fluency, spelling, and reading comprehension at the end of first grade. Follow-up indicated that the groups who received the interventions continued to perform better
than the control group in all areas, but the differences were statistically significant only for phonemic decoding, rapid naming, and spelling.

Despite the aforesaid positive results, there were certain issues to be discussed. The differences in total hours of instruction across groups were not significant, and it was because of the absence of teachers and students in the two instructional conditions. The time diaries revealed that the RWT teachers tended to have their students spend more time on the computers while children in the LIPS condition spent more time receiving small group instruction from the teachers. Then the computer activities in the RWT programme were more attractive and engaging than the LIPS programme. The reading curriculum imparted in two schools was the same but the third school did not use that core reading curriculum. Thus, the instruction materials provided to the students in the intervention conditions was not same. Complete pretests for students assigned to the control group were precluded. Although this was compensated by the random assignment and was verified by the equivalence of their performance on the screening measures but thorough pretests for both experimental and control groups would have been more authentic. Since all students in the intervention condition received both teacher-led instruction and CAI, it could not be ascertained which of the two components of the intervention were necessary for success. In this study, teachers contributed in preparing students for their computer-based learning experiences. This could be one of the additional supportive factors in enhancing students reading ability as against when students were exposed to the computer exercises alone, with no preparatory instruction. These lacunae must be taken into consideration to make this study further applicable.

(c) Comprehension

Reading comprehension is essentially to draw main idea or gist from the context. Difficulty with comprehension hinders the overall reading. Much work has been carried out to help people overcoming comprehension hurdle. Few pertinent studies are discussed below.

Crews (2003) investigated the instructional effectiveness of a CAI phonics-based reading tutorial in helping poor readers improve their ability to read. Secondly, the focus of the research was also to find out how the instructional methods and strategies incorporated in CAI design contributed to the CAI’s effectiveness. The first part of the research was
investigated with a field study. This multi methodological research was conducted as a pretest, post-test case study. The second part was dealt with by investigating a literature review and an in-depth review of the CAI design. Larrabee’s Bridge to Adult Literacy (LBAL), an interactive multimedia, phonics-based, mastery learning CAI reading tutorial was directed at poor readers or non-readers from grade fourth through adulthood. The study was conducted at an elementary school. Participants were 13 students from fourth and fifth grade with poor reading abilities. LBAL programme was executed 30 to 60 minutes per day for 5 days a week. All participants were pre-tested and post tested by using Degree of Reading Power (DRP) exam to measure their reading comprehension. Besides this, interviews of students, teachers and the CAI lab reading specialist were taken to confirm and understand improvements in participant’s reading ability. The students were individually interviewed regarding their perceptions of the CAI programme and their reading skills.

The study described the instructional design features of the CAI after reviewing the literature and explained how these features were important in designing CAI. The tutorial of CAI contained multi-sensory exercises so as to develop and test the student’s knowledge and understanding of reading skills. Cognitive participation of the learner, delivery of multi-sensory instructions through the tutorial, instant feedback, emphasis on phonics skills, etc. were the highlighted features of CAI used in this study. Individualized and self-paced instructions were given. The interviews indicated that the poor readers perceived the programme to be helpful in improving their reading skills.

With so many benefits there are many issues in this study to be looked into. Field investigations have limitations. The DRP data is a one-group pretest-post-test design and the interview data comprise the case study (Campbell & Stanley, 1966). Both these designs have several inherent weaknesses. Though the researcher attempted to overcome these weaknesses by using multiple types and sources of data to substantiate the findings but it would be better to conduct a quasi-experimental study to compare the performance of poor readers receiving CAI with a control group receiving classroom instructions.

The second issue is pertaining to the interview method used. Interview is a qualitative method of collecting information which is subjective and could be biased. So, the teacher’s interview regarding the improvement in their student’s performance might indicate some biasness on the part of the teachers. The interviews should have been taken
twice. If the researcher would have used this questionnaire before the students attended the CAI tutorial, attitudinal changes and post CAI attitudes could be recorded since this could justify students’ perceptions regarding CAI tutorial. But the interviews were taken after the students had attended the CAI tutorial. Another point relating to interview was the questionnaires used. Of the nine objective interview questions, only two were negatively worded, and one of these items was a poorly constructed item. The lack of negatively stated questions could lead to a positive response bias. So, more of negatively worded questions were required. There was no follow-up; simply pre post tests were done. So, generalization of the research findings was absent and long lasting effects of the CAI tutorials could not be traced.

(d) CAI affects different groups differently

Different learners have different needs. They are intervened differently on the basis of their needs. Many research studies have been carried out to examine the effectiveness of computer based programmes on different types of learners. Some of them are discussed here.

In a study carried out by Traynor (2003), it was found out that CAI improves student performance among various types of students. There were 161 participants from fifth and sixth grades. The students were then categorized into one of the four groups: special education, no-English proficient, limited English proficient, and regular education completed instructional units using a computer programme, Cornerstone. Regular students were found to have made greater pretest and post-test gains than special education students. Cornerstone was a CAI programme that incorporated some of the mechanisms that would affect cognitive processes thereby increasing motivation. This programme provided instructions in four main courses: reading comprehension, reading vocabulary, language arts and math. Three of the computer-assisted instruction learning mechanisms were present in the programme that increased learning found in this study. The three mechanisms used in this course were (1) providing practice activities (2) providing a fantasy context and (3) providing the learner with choice over his/her own learning.

Though the results indicated that the CAI programme increased overall student learning but this programme only incorporated three mechanisms of CAI. If the other two mechanisms, i.e., personalizing information and animating objects on the screen would
have been there in the programme, the CAI programme would have worked in a different way and the result could move in different direction.

Another issue in this study is relating to the control group. The control group was absent. Would it have been there, experimental groups could be compared with that group. Full randomization was absent, so it did not represent a true experimental research. Then, demographic characteristics were not taken into consideration. The same course work was taught to the special education students as was taught to the regular and other students. The course work must be supplemented with some intervention programme so that true effect CAI could be observed in the special education students. Permanent teaching effect was also not indicated. Hence the findings could not be generalized.

(e) CAI vs. Teacher-Centred Method

There are different types of methods for instructing students. Instructing students through teacher-centred method is a conventional method of teaching students since past. So, the new upcoming methods of instructing students are always compared with this basic method of teaching to find their effectiveness. There are many studies which have been conducted to compare CAI with the traditional teaching.

In a study by Hancer & Tuzemen (2008), it was found that computer-assisted teaching was more effective than teacher-centred methods to increase academic achievement and to acquire permanent teaching. The subjects were students from 3rd class in the department of science and technology. There were 23 participants in the experimental group and 24 in the control group. Students were equally distributed to both the groups on all grounds. The research was carried out for period of 12 weeks. The Academic Achievement Test used in this study was developed by the researcher himself. Maintaining the format of pretest, post-test and follow-up for a true experiment, the results indicated the effectiveness of CAI over the teacher-centred method both in academic achievement and in acquiring permanent teaching.

Though the results showed that CAI is superior to traditional methods of teaching, there seems to be many points that have been ignored in this study like the course instructions given through CAI was different from traditional teaching method. It might be possible that
the subject matter instructed in traditional teaching method control group was having more difficulty level than in CAI experimental group. This study was done on normal students, what would be the result if the same study had been done on special children. Whether the students had been randomly assigned in this study was also not clear. It could be possible if these lacunae were taken into account, the result might move in another direction.

2.2.2. Issues and Observations

In the studies reviewed above many students demonstrated improvement when using CAI, i.e., students with reading problems when received CAI in reading had shown increased performance in reading decoding or reading comprehension. Salient aspects of the above-quoted studies are summarized in Table 2.2. Results indicated that most CAI programmes in reading employed drill and practice procedures, strategy instruction and simulation. More researchers concluded that a positive motivation toward learning was a result of the use of CAI. Despite all these plus points, still there are many issues that are there to be looked into like the samples used in the above studies were mostly normal readers. Then it was found in some of the studies that different instruction time was spent on different groups. Instruction time should be equally imparted so as to maintain the true experimentation conditions. As there were demographic differences, the effective results obtained can be attributed to this also. The data were collected through qualitative methods like survey, interview, etc. for the student’s perception regarding the learning through CAI in many studies. This again doubts the reliability of the study as qualitative method could have biasness on the part of the experimenter and the subject. In many studies there was only pre-post design with no follow-up. This hindered the generalization of the studies concerned. An important issue that came up was regarding the course instructions. The course instructions with differing difficulty level were imparted to CAI and control groups. Random assignment of students in the studies was also not clear. No concrete conclusions could be drawn from the available literature about the efficacy of CAI in reading instruction; however, this review provided convincing evidence that CAI could enhance reading instruction to promote increased achievement. It was found that individuals had different motivators, and the available literature did not control motivation-related variables.
Table 2.2: Salient Aspects of Computer Assisted Instruction (CAI) Research Studies

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<thead>
<tr>
<th>Author year</th>
<th>Particulars</th>
<th>Method</th>
<th>Measures</th>
<th>Findings</th>
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<td>1. Hall et. al (2000)</td>
<td>- Students of Grade K-12</td>
<td>-17 research studies were reviewed on the basis of: (a) number and grade level of subjects in each study, (b) number and length of CAI sessions, (c) dependent measure(s), (d) summarize the research outcomes. Additionally on (a) type of CAI instruction - drill and practice, strategy instruction, or simulation (b) type of reading intervention - phonological, word recognition for fluency, vocabulary-word meaning, or reading comprehension and higher-order thinking skills.</td>
<td>Initial analysis of the articles was conducted by the third author. Reliability of the analysis was obtained by having the first and second authors identical analysis on 15 of the 17 studies.</td>
<td>- CAI has an overall positive effect on reading achievement. - Analysis concludes that there was increased performance in read</td>
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<td>2. Soe, Koki and Chang (2000)</td>
<td>- Students of Grade K-12</td>
<td>A meta-analysis was done. - 17 research studies were reviewed. -Literature search was carried out in 3 phases: - Document retrieval and abstracting resources. - Previous reviews of the CAI and reading achievement literature.</td>
<td>- r-type effect-size was used in the meta-analysis. - The combined effect-size for 17 studies was found.</td>
<td>CAI has an overall positive effect on reading achievement.</td>
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<td>Author year</td>
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<td>3. Macaruso, Hook, and McCabe (2006)</td>
<td>-167s First Graders from 10 classes of 5 elementary urban schools. -diverse socio- cultural backgrounds of students. -- Two group: Experimental Group (46 male, 37 female) Control group (41 male, 43 female) - 15 students in each group were Title 1 eligible (at-risk).</td>
<td>- Lexia, a CAI programme was used in the experimental group as a supplement to regular reading using explicit phonics instruction. - Treatment Group got intervention for 6 months. - Title 1 students received additional 30 minutes per day of academic instruction.</td>
<td>- Distal Measures were used: • GMRT Letter-sound correspondences for initial consonants, final consonants, vowels, and consonant clusters. • Recognizing basic story words</td>
<td>-Significant reading gains for those participating in CAI. -Post test scores were slightly (not significantly) greater than the control group. -Title 1 students showed significant gains in comparison to control group.</td>
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<td>4. Moody (2007)</td>
<td>-12 students from Grade 3 or 4 participated in 4 week voluntary after- school tutoring programme. - Third and fourth grade teachers participated.</td>
<td>- Myskilltutor, a CAI programme was used. -Two groups: - Myskilltutor within teacher- directed class - Only Myskilltutor -4 weeks programme with two 90 minutes tutoring sessions each week. - Data was collected before, during, and after the implementation of the intervention.</td>
<td>- Teacher developed pretest and post test. -pre and post-opinion surveys. - Individual interviews.</td>
<td>-Myskilltutor was found to be effective in improving reading skills and supported higher order thinking skills such as deduction and investigation. - students indicated a preference for using the CAI during teacher-directed instruction over independent student-directed practice.</td>
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<td>Author year</td>
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<td>5. Watson and Hempenstall (2008)</td>
<td>-31 participants, aged from 4 years to 7 years from 18 primary schools. &lt;br&gt;-Sixteen students were enrolled in Kindergarten and 15 in Grade 1. &lt;br&gt;-Parents of the participants.</td>
<td>-Computer based beginning reading programme, <em>Funnix</em>, on an experimental group of Kindergarten and Grade 1 students. &lt;br&gt;- Computer based reading programme was delivered by parent.</td>
<td>-The reading ability was measured using: <em>Texas Primary Reading Inventory</em>, the <em>Comprehensive Test of Phonological Processing (CTOPP)</em>, the <em>Woodcock Test of Reading Mastery – Revised</em>, the <em>Revised Brigance Comprehensive Inventory of Basic Skills</em>, and <em>Project Aim</em>.</td>
<td>- Statistically significant t effects for kindergarteners in the intervention group on letter-sound fluency, oral reading fluency, non-word decoding, and phonemic awareness skills than did comparison Kindergarteners. &lt;br&gt;-Grade 1 students in the intervention group showed significant improvements over time on letter-sound fluency, letter-name knowledge, non-word decoding and oral reading fluency; but not for the comparison group. &lt;br&gt;-Kindergarteners gained the most benefits.</td>
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<td>6. Torgensen et al. (2010)</td>
<td>- students with reading disabilities &lt;br&gt;- 112 students from first grade in 3 elementary schools.</td>
<td>- A pretest–post-test and follow-up (post 2) design was followed &lt;br&gt;- Interventions were provided for two years. &lt;br&gt;- Children were randomly assigned to three groups; 36 students to <em>Read, Write, and Type</em>, (RWT), 36 students to <em>Lindamood Phoneme Sequencing</em>, LIPS, control group (40 students).</td>
<td>- phonemic decoding accuracy/fluency &lt;br&gt;- rapid naming &lt;br&gt;- spelling &lt;br&gt;- phonological awareness &lt;br&gt;- phonemic decoding &lt;br&gt;- reading comprehension.</td>
<td>-Reading outcomes for LIPS intervention were slightly stronger than for RWT intervention, but statistically not reliable. &lt;br&gt;-Computer supported interventions showed reliably stronger outcomes in phonological awareness, rapid naming, phonemic decoding, word reading accuracy/fluency, spelling, and reading comprehension at the end of first grade.</td>
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<td>Author year</td>
<td>Particulars</td>
<td>Method</td>
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| 7. Crews (2003) | - 13 students from grade 4th and 5th. | - Students attended CAI lab up to 5 days a week using LBAL program 30 to 60 minutes per day. | - Larrabee’s Bridge to adult Literacy (LBAL): an interactive multimedia, phonics-based, mastery learning CAI reading tutorial.  
- Degree of Reading Power exam (DRP) was used for pretesting and posttesting of comprehension.  
- Interviews of the students were done. | - CAI phonics-based reading tutorial LBAL is effective in helping poor readers improve their ability to read, engaging cognitive participation of the learner, delivering multi sensory, interactive learning, providing timely, directed feedback, delivering systematic phonics instruction and implementing mastery learning. |
| 8. Traynor (2003) | -161 participants from fifth and sixth grades. | - Students were categorized into four groups: special education, no-English proficient, limited English proficient, and regular education completed instructional units using a computer programme, Cornerstone. | - reading comprehension, reading vocabulary, language arts and math. | - Regular students were found to have made greater pretest and post-test gains than special education students.  
- CAI overall student learning |
| 9. Hancer and Tuzemen (2008) | -47 students from 3rd class of science and technology department were taken (23 in the experimental group and 24 in the control group)  
- There was demographic equality. | - Research continued for 12 weeks which included pretest, final test and permanence test. | - Academic Achievement Test developed by the researcher himself was used. | - Computer- assisted teaching is more effective than teacher-centered methods to increase academic achievement and to acquire permanent teaching |
From the studies it was not clear which particular software focused on the improvement of reading achievement for elementary age students. The role of the teacher in the effective use of CAI for effective reading instruction was not clear. It was questionable whether pencil and paper tests could accurately assess reading skills gained through CAI.

All the above said lacunae could pose validity and reliability problems regarding the results of the studies. If these were dealt with then the studies could be generalized.

2.3. Traditional Classroom Reading

Traditional classroom teaching, also known as back-to-basics is the society approved traditionally appropriate teaching customs found in schools. This method uses the relics of generations for learning like textbooks, chalkboards, and paper and pencils, etc. Traditional teacher-centered methods focus on rote learning and memorization. Traditional education focuses on teaching, not learning.

2.3.1. Research Studies on Traditional Classroom Teaching

Various studies have been carried out to evaluate traditional classroom instruction method. But there are very less studies favouring traditional teaching methods in comparison to other methods of teaching. Blake, Gibson & Blackwell (2003) noted 248 researches studies and found that online learning is just as effective a classroom instruction. Online learning is at par with classroom instruction for different types of subjects. Some examples include agricultural economics (Batte, Forster & Larson, 2003), government (Botsch & Botsch, 2001) and financial management (Ashkeboussi, 2001). The research also ascertains that most students are equally satisfied with the traditional classroom as with the online experience.

Research shows when reading instructions are taught focusing on meaning and phonics in terms of context, the early readers become better readers than those whose reading instruction emphasizes traditional phonics out of context. Sacks & Mergendoller (1997) in their study of 132 kindergartens of eleven class rooms found that children who scored the lowest on entry into kindergarten showed improvement in reading when taught with contemporary, meaning- emphasis reading instruction and showed least improvement when taught with traditional phonics- oriented reading instructions.
Eldredge, Reutzel, and Hollingsworth (1996) studied the reading growth of 78 second-grade children. Some were taught in classrooms with shared reading and some with traditional round-robin reading. In round-robin reading children take turns reading a story orally and the overall results favoured the shared reading in word analysis and oral reading.

Freppon (1991) studied 24 first-graders in four classrooms, two with a contemporary reading programme that focused on meaning and two with a traditional skill reading programmes. It was found that the children in the contemporary classrooms had a better understanding for constructing meaning with print and they were almost twice successful at sounding out words than traditional classroom children.

Not much research studies that have been carried out to discuss traditional classroom teaching method, only few are there and that too they have been compared with other form of teaching. Few of them have been critically examined in this section.

Johnson, Burnett & Rolling (2002), carried out a study to compare traditional classroom instruction with an electronic classroom format in a consumer economic course. It was found that students enrolled in the electronic classroom format (specifically the internet) scored higher on the achievement post-test than traditional classroom setting after controlling for pretest differences in the groups. They took 25 (traditional group) and 13 (online group) undergraduate students from the consumer sciences course. Secondly, it was found that the students in the online section spent 6 to 10 hours per week working on the course while the traditional classroom students reported only 5 hours working per week or less. The same course was instructed by the same instructor to both the groups only the way was different. The variables were measured by using two instruments, first being an instructor-designed, multiple-choice achievement test which was administered to both the groups as a pretest and a post-test. The second instrument was a survey designed to measure the student’s perceptions regarding the influence of the course format on their learning, problems encountered, and satisfaction with the course.

Data was collected and findings from this study revealed several issues. The higher scores on the part of online students were because of 6-10 hours of time spent per week working on the course whereas traditional group spent only 5 hours a week or less. The
time spent on the course should be equal. Since the online method placed more responsibility on the part of learners because of psychological independence, their achievement levels were higher. Another issue that arises is that if greater number of hours spent on the internet course was the reason for higher achievement level, then the difference would probably be diminished as the use of internet became routine for the students. As there were demographic differences, the results obtained could be attributed to that also. More demographic information should have been collected. Survey was done to measure the student’s perceptions, which is again a qualitative way of collecting data. This survey could have biasness on the part of the experimenter and the subjects, so the results could not be generalized.

As the study done by Johnson et al. did not conduct the follow-up, the question of reliability again arises. The level of motivation and knowledge of retention, etc. were not indicated. One question that still needs to be answered is why students spent more time on online courses. There was a lack of true experimental design in this study. Full randomization was absent, there were unequal group sizes. Lack of full randomization had resulted in pre-existing differences effects. The study was not conducted on children having reading difficulties. The study took into consideration only the academic achievement and not in particular the reading achievement. Had these two variables been taken into consideration, the results obtained would have been more authentic in the reading intervention field.

In further exploring the efficacy of traditional methods of teaching, Gallagher et al. (2005) conducted a pilot study to compare traditional classroom and web based instruction in gerontology. The study examined the effectiveness of alternative methods for the course delivery on students from a dental hygiene gerontology course. They were given instructions both on the web and in a traditional classroom setting. Questionnaires were sent to both groups of students completing the course. Certain points were taken into consideration while conducting this study like familiarity with web-based instruction, prior computer training, previous interaction with the elderly, and student evaluations of course effectiveness. Accordingly the data were collected. Post-tests were taken for both the groups. A comparison of student characteristics enrolled in the two course formats revealed marked differences. There were statistically significant
differences between both the instructional outcomes of the students enrolled in these two formats. It was found that there was greater retention of course material six months after completion of the course in the web-based format. It was found that students who were given web-based course format demonstrated greater motivation and learning success in their final course grades, completing assignments, and knowledge retention over time.

One issue here is that it was only the pilot study conducted on a small number of students. So, generalization of the data is not possible. Another point to be considered is that the number of students taken in both the groups was uneven. Web-based students were only 12 whereas traditional classroom students were 32 in number. So, proper instruction might not be delivered to both the groups. The students were not randomly assigned so it might also pose a bias problem. As there was psychological independence in case of online instruction, this had created an issue in comparing traditional and online instruction. It had been found that if higher levels of psychological independence could be achieved, students learned more, but they also developed a sense of ownership for their learning which would enhance their involvement in continued learning after their formal education was completed. The sample comprised of dental hygiene gerontology, if this sample would have been children with reading difficulties, it would be more helpful in the area of reading difficulties.

Further Molaei (2007) also conducted a study to find the effectiveness of traditional teaching. In that he also came with the effectiveness of blended learning also. The research was conducted to examine the differences in terms of quality and satisfaction between online and traditional classroom learning for undergraduate course and secondly to highlight the effectiveness of blended-style education. Thus specifically the study was supposed to find the difference between three methods of learning, i.e., electronic learning, face-to-face and blended style of education. 127, 130 and 140 students from economic course participated in the three traditional, online and blended groups respectively. The course had the same instructor, textbook, lecture slides, assignments and grading methods for all the three groups except the way of teaching was different.

Results showed that there was no significant statistical difference between traditional and online group whereas the blended group showed enhanced learning. The students in the
online class did not perceive enhanced learning as compared to students in the traditional class. Further there was lowering in the dropout rate in case of blended learning as compared to the other two methods. It was found that for introductory courses, traditional learning environment was more satisfying than online classes. Though the course had the same textbook, instructor, assignments, etc., the difference was that the 2005 class was delivered in a traditional classroom setting, and the first semester of 2006 class was delivered online but in the second semester of 2006, students were enrolled in a blended learning style with a similar context to two other styles. So, the delivery of instructions was not uniform. The second issue is that all the three groups, i.e., traditional, online and blended styles were required to take their exams in a traditional classroom setting. If the exams would have been conducted in the same learning style in the respective groups, the results could have been different. Would the 2005 semester have been taught to all the three groups and first semester of 2006 to all the three groups, the results obtained could be different. Since the intention of this study was to find the differences in the quality and level of satisfaction, there could be biases on the part of the subjects and the experimenter as quality and satisfaction level are the qualitative terms. Taking all these points into consideration, a more refined study could be look forward to.

Stivason et al. (2008) conducted a comparison of student performance in an online instruction with traditional classroom teaching. Students from the accounts course were taken as sample. An accounting professor taught the same lessons in two different learning environments—online and classroom. Two of the sections were taught in the traditional classroom setting and one section was taught online. The impact of different testing methods was also evaluated. The assignment of students to each section, two in-class sections and one online section, was self selection. This was however not completely random. 31 students enrolled in each of the traditional sections and 22 registered for the online section. Only 23 in traditional classroom and 16 in online completed the course. Both groups of students were given tasks consisting of problems requiring calculations, analyses, or short answers. A major difference was that online students had access to the text, and possibly other aids, while the classroom students did not.

Results showed that there were no significant differences in performance between the two in-class sections. The online students performed better on their assessment tasks than
the traditional classroom assessments because online students had access to the text and other aids. It was found that the online assessments did not improve significantly when students were given extended time to complete the work. Another finding was that when in-class students were given equal advantage as with online students in the form of take-home assignments (text and other resources), they performed better.

The issue obviously in this study was the inequity between the two learning environments. Until a research study is conducted under control situations, the results obtained cannot be called authentic. Online students, in this case had access to the text and other aids. So, all the time they would be having inflated grades in comparison to traditional classroom students. But proctoring of online assessment is not feasible since it is not permissible. So, generalization of results is threatened because of extraneous factors.

2.3.2. Issues and Observations

All the studies discussed and reviewed above had not been advocating the use of traditional classroom teaching alone rather all the studies took traditional classroom method as a control group comparing it with other instructional methods like online teaching or PALS or CAI, etc. Salient aspects of the above-quoted studies are summarized in Table 2.3. Demographic differences were again a matter of concern in these studies too. In most of the cases there was no follow-up after the interventions were over. Only pre-post tests were executed. Samples were found unevenly distributed amongst the groups. There was no randomization of the sample. The results obtained were then lacking authenticity. Psychological dependence was one factor that was dominating the minds of students in the traditional classrooms. They were thoroughly dependent upon their teachers. This dependence was absent in other interventional programmes. This dependence could be one of the factors that could be affecting the students reading achievement. Normal students from different academic areas were taken as samples. Samples were not particularly from the field of reading or learning difficulties. There was the presence of extraneous factors operating in the above studies which might be tampering the results.
Table 2.3: Salient Aspects of Traditional Classroom Teaching (TCR) Research Studies

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<th>Author year</th>
<th>Particulars</th>
<th>Method</th>
<th>Measures</th>
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<tr>
<td>1. Johnson et al. (2002)</td>
<td>38 undergraduate students of consumer sciences course (25 in traditional and 13 in online class)</td>
<td>Same course by the same instructor was administered in the traditional and online format. -Online students spent 6-10 hours per week on the course -Traditional classroom students spent 5 hours a week or less.</td>
<td>Instructor-designed 70-item multiple-choice achievement test. -A survey designed (modified version of an instrument designed by Carter (2001)) to measure student’s perceptions regarding the course on their learning, problems encountered and satisfaction with the course.</td>
<td>Online students scored higher than traditional classroom students</td>
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<td>2. Gallagher et al. (2005)</td>
<td>44 students from gerontology dental hygiene were taken. -12 in web-based group and 32 in traditional classroom teaching group. -Marked differences in their characteristics. More than half of web-based group were over 25 years of age and had taken online course. Majority of traditional group were of 25 years or less and had not taken online course.</td>
<td>-Questionnaires were sent to both groups completing the course. -The instrument was designed to establish profiles of the participating students. -Questionnaire included -familiarity with Web-based instruction -extent of prior computer training -previous interaction with the elderly -student evaluations of course effectiveness. -Traditional instructional outcomes from evaluated course work were compared, as were post course exam outcomes that assessed retention of course information six months after course completion.</td>
<td>Statistical Package for Social Scientists software (SPSS, Inc., version 12.0, Chicago, IL).</td>
<td>Students retention of the course material six months after completion of the course was greater in the web-based format. -Students showed greater motivation, learning success and knowledge retention over time in case of web-based instruction</td>
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<td>3. Molaei, M. A. (2007)</td>
<td>397 undergraduate students from economics course. -127, 130 and 140 were assigned to traditional, face-to-face and blended style of education. -All students were equal at the demographic level.</td>
<td>Same instructor, textbook, lecture slides, quizzes, exams, assignments, and grading methodology were used. -The first semester of 2005 class was delivered in a traditional classroom face-to-face setting -The first semester of 2006 class was delivered online -The second semester of 2006 students was enrolled in a blended learning style. - Students who enrolled in the online class and blended style were required to complete their exams in a traditional classroom setting</td>
<td>- Data were analyzed using descriptive statistics and t tests. -The &quot;Student Evaluation of Instruction (SEI)&quot; instrument. - The instrument uses Likert-type scale items. -SEI participation was voluntary.</td>
<td>Blended learning (combination of online and face-to-face classes) is more effective on student achievement. -No statistically significant differences in student satisfaction were found on online and traditional style. -There was a significant difference between blended learning with two other styles.</td>
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<tr>
<td>4. Stivason et al. (2008)</td>
<td>Students were self selected and assigned to each section, 2 in-class sections and 1 online section.</td>
<td>- There are three sections of an introductory accounting course in two different learning environments—online and classroom. - Two of the sections were taught in the traditional classroom setting and one section was taught online. -Both groups were given quizzes consisting of problems requiring calculations, analyses, or short answers. 6 quizzes in class with 20-minute time limit and 6 quizzes given as take-home assignments with a 48 hour time limit. -Additionally, students in the online course had access to the book and other aids for all of the assignments while the traditional class had these aids only for the take-home assignments. - 2 exams were taken. One was to completed in a 75 minute period and other was take home exam.</td>
<td>Quizzes and exams were both given in a time-controlled environment and in a two-day take-home environment. - t-tests were used</td>
<td>Online students performed better on their graded assessments than the traditional classroom assessments when timed. -One result of interest is that when in-class students were given equal footing (text and other resources) with online students on take-home assignments they performed better. -On the other hand, perhaps it is evidence that the in-class setting is a superior learning environment for the typical student because, when students were given access to additional resources traditional students outperformed online students</td>
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2.4. Summary

The aforementioned evidences suggest that the above interventions suffered from certain methodological problems. An intervention seems to be effective only when the results found can be transferred, generalized and its effects can be maintained (Shanahan & Bart, 1995). Besides this, intervention must use reliable and valid measurements. Children with reading difficulties have different types of needs, thus the remedial intervention also varies. Taking all the lacunae into consideration, the present research study was designed so as to provide valuable information on use of specialized instructional programmes and to design better instructional programmes for children with reading difficulties. Different intervention programmes have focused on word attack, word recognition and reading comprehension. The present study examined the comparative effectiveness of the peer-assisted learning strategies (PALS), computer-assisted instruction (CAI) and traditional classroom reading programme (TCR) on the reading skill acquisition of students with reading difficulties. Numerous research studies have been conducted with intent to identify the best practices for improving the reading comprehension levels of students with learning disabilities.