Chapter-II

REVIEW OF LITERATURE

2.0 INTRODUCTION

In the previous chapter, the introduction part, that is, theoretical background of the problem selected, statement of the problem was given, significance of the study was focused, objectives, hypotheses, limitations of the study were stated and the operational definitions were given.

In the present chapter, the researcher had gone through the literature related to this study and a brief review of the related studies is presented hereunder.

2.1 REVIEW OF LITERATURE

Literature survey is the documentation of a comprehensive review of the published and unpublished work from secondary sources data in the areas of specific interest to the researcher. The library is a rich storage base for secondary data and researchers used to spend several weeks and sometimes months going through books, journals, newspapers, magazines, conference proceedings, doctoral dissertations, master's theses, government publications and financial reports to find information on their research topic.

2.2 REVIEW OF RELATED LITERATURE

2.2.1 Learning difficulties

Ahmad M. J. O. AL Fawair, Jamal M. S. AL Khateeb and Yazan Abdel Aziz Semreen AL-Wreikat (2012) examined the relationship between a training
program designed for students with learning disabilities and their perceived competence. The need for such endeavor must be accorded due attention in order to create a comprehensive policy reform that takes into account the different dimensions of effectual reform. The study declares the need for providing a clear insight into the obstacles faced by Jordanian students, especially those in the rural areas, who are continually hampered by learning disabilities. In an attempt to answer the research questions, the “Perceived Competence Scale for Children” (Harter, 1982) was used as the main tool in the study. Moreover, the study sample consisted of 26 fourth-grade students with learning disabilities who joined the resource rooms of the Ministry of Education in the Jerash district of Jordan. Findings of the study indicated the presence of significant statistical differences between the experimental group that underwent the training program and the control group that was not exposed to it.

Julia Gallegos, Audra Langley and Diana Villegas (2012) compare severity and risk status for anxiety and depression with coping skills among 130 Mexican school children with learning disabilities (LD) and 130 school children without LD. This research is the first to explore the emotional difficulties of Mexican children with LD. Children completed the Spanish version of the Spence Children’s Anxiety Scale and Children’s Depression Inventory, and the Cuestionario de Afrontamiento (Coping Skills Questionnaire). Results indicated that a higher percentage of children with LD were at risk for anxiety (22.3% vs. 11.5%) and depression (32% vs. 18%). No statistically significant differences were found for coping skills. Results support the idea that there is an increased awareness of comorbid depression and anxiety among students with LD and a need to promote
early identification and intervention in schools. Efforts should focus on better understanding the relationship between social-emotional difficulties and academic achievement and on developing effective interventions to support children with LD.

Woori Kim, Sylvia Linan-Thompson and Radhika Misquitta (2012) examined the effectiveness of critical factors in instruction for improving the reading comprehension of middle school students with learning disabilities. Five critical factors were identified: (i) type of instructional methods, (ii) self-monitoring, (iii) components of reading incorporated, (iv) fidelity of instruction (scripted vs. nonscripted and researcher vs. teacher), and (v) group size. Fourteen studies published between 1990 and 2010 were reviewed. The findings indicated that interventions incorporating strategy instruction, specifically, main idea and summarization, yielded high effects on comprehension. The use of self-monitoring combined with main idea strategy improved comprehension performance. It was found that both, instruction targeting comprehension alone, as well as comprehension that incorporated other reading components such as vocabulary had significant effects on comprehension. Researcher-delivered instruction with script yielded higher effects across intervention types. One-on-one instruction or instruction in pairs was more effective than large group instruction across intervention types.

Douglas D. Dexter, Youn J. Park and Charles A. Hughes (2011) presented a meta-analysis of experimental and quasi-experimental studies in which intermediate and secondary students with learning disabilities were taught
science content through the use of graphic organizers (GOs). Following an exhaustive search for studies meeting specified selection criteria, 23 standardized mean effect sizes were extracted from six articles involving 271 participants in grades 6 through 12. Findings included that, across immediate posttest and maintenance conditions, the use of graphic organizers was associated with increased vocabulary knowledge and factual comprehension measured by researcher-generated multiple-choice tests in science. Conclusions, implications for future research, and practical recommendations are presented.

José Carlos Núñez, Julio Antonio González-Pienda, Celestino Rodríguez, Antonio Valle, Ramon Gonzalez-Cabanach and Pedro Rosário (2011) hypothesized that the existence of diverse motivational profiles in students with learning difficulties (LD) and the differential implications for intervention in the classroom are analyzed. Various assessment scales (academic goals, self-concept, and causal attributions) were administered to a sample of 259 students with LD, ages 8 to 15 years, in Spain. The data obtained were analyzed through (a) cluster analysis to study this hypothesis and (b) MANOVAs to determine the extent to which such profiles were accompanied by significant differences in self-esteem and causal attribution patterns. The results revealed four different motivational profiles and significantly different levels of self-esteem and causal attribution process.

Jolyn D. Whitaker Sena, Patricia A. Lowe and Steven W. Lee (2007) examined the relationship between students with and without learning disabilities (LD) and different aspects of test anxiety on a new multidimensional measure of
test anxiety. A sample of 774 elementary and secondary school students—195 students with LD and 579 students not identified with LD—completed the Test Anxiety Inventory for Children and Adolescents (TAICA), a new multidimensional measure of test anxiety for elementary and secondary school students in Grades 4 through 12. Examination of the factor structure of the TAICA scores across LD status to determine whether accurate test score interpretation was possible revealed that the majority of the coefficient of congruence values between each pair of six corresponding factors of the TAICA (Cognitive Obstruction/ Inattention, Performance Enhancement/Facilitation Anxiety, Physiological Hyperarousal, Social Humiliation, Worry, and Lie) and the Total Test Anxiety factor were above .90, and the salient variable similarity index values were statistically significant, suggesting that the factor structure of the TAICA was similar across groups. The results of seven multiple regression analyses revealed that LD predicted higher Cognitive Obstruction/Inattention and Worry scores and lower Performance Enhancement/Facilitation Anxiety and Lie scores. Implications of the findings for school personnel who work with students with LD are discussed.

Madhuri Kulkarni, Sunil Karande, Anjana Thadhani, Hetal Maru and Rukhshana Sholapurwala (2006) assessed the impact of the provisions of the Maharashtra government on the academic performance of children with specific learning disability (SpLD) at the Secondary School Certificate (SSC) board examination. The academic performance of 60 children (45 boys, 15 girls) at the SSC board examination with benefit of chosen provisions was compared with their performance at their last annual school examination before diagnosis of SpLD. The results show that there was a significant improvement in their mean
percentage (%) total marks scored at the SSC board examination as compared with the mean % total marks scored by them at their last annual school examination before the diagnosis (63.48 ± 7.86 vs. 40.95 ± 7.23 ) [mean ± SD, mean % difference = 22.53, 95% CI = 19.8 - 25.26, P < 0.0001, using student’s t test]. Also, children who had availed exemption of one language or opted for lower grade of mathematics had scored significantly better marks in their optional subjects (P < 0.0001 and P = 0.0009, respectively). Conclusion. Children with SpLD who availed the benefit of provisions showed a significant improvement in their academic performance at the SSC board examination.

Francis et al. (2005) used simulated data where the group subdivision were inherently arbitrary to examine the stability of IQ discrepancy and low-achievement definition of LD. Actual sample involve 445 children. The Woodcock-Johnson Psycho educational Test Battery was administered yearly beginning in kindergarten through grade 12 and into adulthood. Test scores from grade 3 & 5 were selected for analysis these results showed that the practice of sub-dividing a normal distribution with arbitrary cut points leads to instability in group membership. Approaches to the identification of children as having LD based solely on individual test scores not linked to specific behavioral criteria lead to invalid decision about individual children.

Omotosho (2001) examined the type of learning problems identified by the parent and teachers among elementary school in Ilorin metropolis, Nigeria. The findings for 407 parents and teachers showed that a significantly large proportion identified various learning disabilities problems among their students/pupils. The
learning disability problems identified by the largest population were Mathematics problems followed by the most problems reported were writing, reading, attention, speech, memory and visual problems.

Vaughn & Elbaum (1999) viewed that because learning disabilities encompass varied disorders associated primarily with difficulty learning, and due to the fact that time spent in school is a substantial part of the day, our central focus is upon children attending school. Both positive and negative school experiences shape children’s self-perceptions and contribute to their academic self-concepts. Unfortunately, for many children with learning disabilities, their lowered academic self-perceptions are influenced by difficulties in both the academic and social aspects of school.

Handwerk et al. (1998) investigated the behavioral and emotional problems of children with learning disabilities (LD) serious emotional disturbances (SED) and LD/SED, using the Teacher Report Form (TRF). The sample consisted of 217 students with LD, 72 with SED & 68 with SED/LD ages 6 to 18 (mean age = 11.5). A univariate analysis revealed that four scales significantly contributed to the multivariate effect for gender. Parents rated girls has having more somatic complaints, attention problems, more delinquent behavior and more aggressive behavior than boys. And for social problems, the SED group scored higher than the LD group (LD < SED). Also the children with learning disabilities differed from those with SED (serious emotional disturbance) mainly in terms of severity of problems, not with respective type of problems.
Margalit (1998) examined loneliness and coherence among Israeli pre-school children with learning disabilities. The sample consisted of 187 pre-school children divided into three groups (a) 60 children at high risk for developing learning disabilities, 47 boys and 13 girls. (b) 76 non-handicapped peers from the same pre-schools, 56 boys and 20 girls. (c) 51 children (38 boys & 13 girls) the research instruments consisted of the children’s Sense of Coherence Scale, the loneliness scale, a peer nomination procedure and teachers’ ratings. Two-way MANOVAs demonstrated that the two groups of children with LD and with a high risk for developing learning disabilities were less accepted by peers than students in the nondisabled group and their number of reciprocal nominations was smaller. Furthermore, their teachers viewed exhibiting more learning difficulties and less adjusted behaviors than their counterparts (Non-disabled peers). Gender comparisons revealed that girls were showed higher levels of adjusted behavior than boys. And also high loneliness scores and low sense of coherence were found among the children with learning disability and the high risk group. Findings of the study was supported by studies highlighted their social distress.

Margo A. Mastropieri and Thomas E. Scruggs (1994) described recent educational reform efforts in science education and their potential impact on students with disabilities. An analysis of the curriculum in science education in four school districts from four different states is presented. Two districts employ a content approach using textbooks as the dominant instructional medium, while the other two districts employ a hands-on approach using manipulative activities and thematic units. Comparisons are made within and across the activities-
oriented and textbook approaches. Implications for students with disabilities are discussed.

Mahajan (1994) investigated the effects of enhancing cognitive functioning through training in verbal and non-verbal tasks. The sample consisted of thirteen learning disabled students of grade IV. Results of the study revealed that training in verbal and non-verbal tasks had positive significant effect on enhancing cognitive functions. Use of verbal prompts and cues helped the fourth grade LD children improve their performance from pretest to posttest in classification and categorization.

Ginsburg & Bronstein (1993) studied family factor related to children’s intrinsic/extrinsic motivational orientation and academic performance. They examined three familiar factors-parental surveillance of homework, parental reactions to grades and general family style. Family, Parent and child measures were obtained in the home from 93 fifth graders and their parents. Teachers provided a measure of classroom motivational orientation. Grades and achievement score were obtained from school records. Higher parental surveillance of homework, parental re-actions to grades that included negative control, un-involvement or extrinsic reward and over-and under-controlling family styles were found to be related to an extrinsic motivational orientation and lower academic performance. In addition, socio-economic level was significant predictor of motivational orientation and academic performance.
Bodner (1991) has listed several factors that may lead to misconceptions in the minds of learners. He notes the problems of rote learning where students possess knowledge without understanding. When the teacher first introduces an idea, the learner may already possess previous experience (derived from the world around, including the media), which leads to confusion. In addition, there is also the problem where the scientific language remains constant while the meanings of the terms change until they become misleading.

Johnstone & Letton (1991) described that when students are faced with learning situations where there is too much to handle in the limited working space, they have difficulty selecting the important information from the other less important information. The latter has been described as “noise”, the student having difficulty in separating the signal from the noise.

J. Ron Nelson (1989) presented the results of a review of the literature on services available or recommended for students with learning disabilities. The results suggest that postsecondary institutions have begun to provide a wide array of services to these students. There is little empirical evidence, however, on the effectiveness of those services. An agenda for future research is also discussed.

White (1988) argued that the issue of long-term and short-term goals is relevant to the learning of science. The student who goes to lectures with a short-term goal of passing examinations often has a specific approach to learning. Scientific laws and potentially meaningful facts are learned as propositions
unrelated to experience. Too often examinations reward the recall of such facts. On the contrary, the students who have a stronger sense of achievement, or who want to learn about science, may attend the lectures with a long-term goal of a deeper understanding and appreciation of science. They may approach it involving advanced learning strategies of reflection and inter-linking of knowledge. With the pace of normal lectures, there is unfortunately little opportunity for this to occur during the lectures.

Resnick (1987) found that students will engage more easily with problems that are embedded in challenging real-world contexts that have apparent relevance to their lives. If the problems are interesting, meaningful, challenging, and engaging they tend to be intrinsically motivating for students.

Janaki (1986) studied the poor school performance in school children’s. The sample consisted of 117 girls of Sixth standard of an English medium convent day school. Results suggested that a significant difference in IQ between the average and below average was seen on verbal performance and full scale measures on WISC. Scholastically below average children also had an average IQ. Preponderance of nuclear families, lesser socio-economic and material facilities were seen in the below average group. Poor concentration, although prevalent in both groups was greater in the below average group. Reading and writing difficulties tended to be slightly more common in the below average group.

Bhattacharya (1985) tried out a technological approach for alleviation of learning disabilities of the students in life science. Results of the study indicated
that learning through audio-visual materials and techniques caused prolonged retention than by traditional methods.

Cassels and Johnstone (1980) had shown that the non-technical words associated with science were a cause of misunderstanding for pupils and students. Words, which were understandable in normal English usage, changed their meaning (sometimes quite subtly) when transferred into, or out of, a science situation. For example, the word “volatile” was assumed by students to mean “unstable”, “explosive” or “flammable”. Its scientific meaning of “easily vaporised” was unknown. The reason for the confusion was that “volatile”, applied to a person, does imply instability or excitability and this meaning was naturally carried over into the science context with consequent confusion.

White (1977) argued that learning involves the interaction of the information that the learner receives through his sensory system and the information that he or she already has available in his or her long-term memory. This enables the learner to recognise and organise the incoming information and make sense of it. Unfamiliar or confusing words and constructions come into conflict with the organisational process. White also emphasised that the cognitive processes may be considered to involve the interaction of the components of memory: Working memory and long-term memory.

2.2.2 Learning difficulties in Science

Amjad Islam Pitafi and Muhammad Farooq (2012) aimed to measure the scientific attitude of secondary school students. The data were drawn from ten
schools of District Rajanpur, Pakistan. Total samples of 100 students were drawn randomly. The instrument was consisted of student questionnaire. The questionnaire contains eight main elements of scientific attitude which are: curiosity, rationality, willingness to suspend judgment, open mindedness, critical mindedness, objectivity, honesty and humility. This study was being made to know the development of scientific attitude of Grade 10 students. Using statistical procedure, the empirical data was analyzed. The mean score for each items, eight parts and over all were calculated. The analysis shows that the attitude of the students is slightly scientific.

Kathleen Seifert and Christine Espin (2012) examined the effects of three types of reading interventions on the science text reading of secondary students with learning disabilities (LD). Twenty 10th grade students with LD participated in the study. Using a within-subjects design, the relative effects of three different instructional approaches—text reading, vocabulary learning, and text reading plus vocabulary learning—were examined and compared with a control condition in which participants received no instruction. The effects of the interventions on reading fluency, vocabulary knowledge, and comprehension were examined. Results revealed that the text-reading and combined interventions had a positive effect on reading fluency and vocabulary knowledge, and that the vocabulary intervention had a positive effect on vocabulary knowledge. Potential effects were found for the comprehension measures. Results imply that students’ reading of science text and knowledge of the vocabulary used in that text, can be improved with direct instruction.
Cil, Emine; Cepni, Salih (2012) analyzed the effectiveness of the conceptual change approach, explicit reflective approach, and the course book by the Ministry of Education on the views toward the nature of science and conceptual change in the Light unit. Three study groups were selected from several seventh grade classes. Two of the three classes, including 22 students, were assigned to participate in the experimental study group and the other was assigned as a control group. A conceptual change approach was used in one of the groups, whereas explicit reflective approach was used in the other one. An open-ended questionnaire on the views of nature of science in conjunction with semi-structured interviews, and the Conceptual Test of Light Unit were used to collect the data. The students’ views toward the nature of science were analysed in informed, transitional, and naive categories. The Kruskall-Wallis Test and Wilcoxon signed-rank test were used for the analysis of the conceptual test data. It was determined that the most effective way to teach the nature of science was the conceptual change approach. Three teaching methods contributed positively to the conceptual change about light, but it was found out that the effects of course book of Ministry of Education were not long term. It is recommended that the conceptual change text and concept clipboards should be used together in teaching the nature of science.

Students with learning disabilities (LD) are increasingly expected to master content in the general education curriculum, making the need for effective instructional supports more important than ever before. Science is a part of the curriculum that can be particularly challenging to students with LD because of the diverse demands it places on cognitive performance. Frederick J.
Brigham, Thomas E. Scruggs and Margo A. Mastropieri (2011) reviewed a number of strategies that have been validated for learners with LD. The strategies include supports for (a) verbal learning of declarative information, (b) processing information in texts, (c) activities-based instruction/experiential learning, (d) scientific thinking and reasoning, and (e) differentiated instruction. We also summarize the research regarding the impact of teacher behavior on achievement for students with LD in science education. The strategies reviewed yield tangible and positive effect sizes that suggest that their application to the target domain will substantially improve outcomes for students with LD in science education.

William J. Therrien, Jonte C. Taylor, John L. Hosp, Erica R. Kaldenberg and Jay Gorsh (2011) evaluated the effectiveness of instructional strategies in science for students with LD. Twelve studies were examined, summarized, and grouped according to the type of strategy implemented. Effect sizes (ES) were calculated for each study. Across all studies, a mean ES of .78 was obtained, indicating a moderate positive effect on students with LD science achievement. Findings also align with past reviews of inquiry-based instruction for students with special needs, indicating that students with LD need structure within an inquiry science approach in order to be successful. Additionally, results suggest that mnemonic instruction is highly effective at increasing learning disabled students' acquisition and retention of science facts.

Kalman, Calvin S. (2011) explained in his study that the students can have great difficulty reading scientific texts and trying to cope with the professor in the classroom. Part of the reason for students' difficulties is that for a student taking a
science gateway course the language, ontology and epistemology of science are akin to a foreign culture. There is thus an analogy between such a student and an anthropologist spending time among a native group in some remote part of the globe. This brings us naturally to the subject of hermeneutics. It is through language that we attempt to understand an alien culture. The hermeneutical circle involves the interplay between our construct of the unfamiliar with our own outlook that deepens with each pass. It can be argued that for novice students to acquire a full understanding of scientific texts, they also need to pursue a recurrent construction of their comprehension of scientific concepts. In this paper it is shown how an activity, reflective-writing, can enhance students' understanding of concepts in their textbook by getting students to approach text in the manner of a hermeneutical circle. This is illustrated using studies made at three post-secondary institutions.

Frederick J. Brigham, Thomas E. Scruggs and Margo A. Mastropieri (2011) discussed the learning disabilities of students in their research paper entitled “Science Education and Students with Learning Disabilities”. Students with learning disabilities (LD) are increasingly expected to master content in the general education curriculum, making the need for effective instructional supports more important than ever before. Science is a part of the curriculum that can be particularly challenging to students with LD because of the diverse demands it places on cognitive performance. In this summary we review a number of strategies that have been validated for learners with LD. The strategies include supports for (a) verbal learning of declarative information, (b) processing information in texts, (c) activities-based instruction/experiential learning, (d)
scientific thinking and reasoning, and (e) differentiated instruction. They also summarized the research regarding the impact of teacher behavior on achievement for students with LD in science education. The strategies reviewed yield tangible and positive effect sizes that suggest that their application to the target domain will substantially improve outcomes for students with LD in science education.

Scheuermann et al. (2009) used the concrete – to representational – to abstract (CRA) instructional sequence; their literature review found that when students concretely experience a mathematical concept, they are able to truly understand the concept being introduced. Past research also revealed that students with learning disabilities improve performance when explicit and sequential instruction is used. Additionally, previous research led to the conclusion that sequential mathematical scaffolding was also an essential component of the development of mathematical proficiency and understanding. Although each practice was evidence-based, this combination of educational practices from general education and special education had not been created.

Joshua Idar and Uri Ganiel (2008) examined and dealt within the context of an introductory physics course in Israeli high schools. Following a detailed task analysis, the cognitive entry requirements for this course were identified, and students tested for them. Secondly, specific difficulties students encountered during the study of the course, and prevailing misconceptions held by many of them, were identified. Based on all the above information, a remedial teaching method was developed. It consisted of supplying students with immediate and
frequent feedback, to reinforce their understanding, correct misunderstandings, and fill in gaps in necessary background skills, while teachers could continuously monitor the progress of each individual student. The whole process took place within the *natural classroom setting*, without additional staff or time requirements. The method was implemented in a large number of schools, and its impact was assessed using an experimental versus control analysis of covariance design. Achievements in the experimental group were significantly higher. The statistical analysis used students' background as the covariate. Of the 47% of the variance, which the model accounted for, 24% were explained by the covariate (background), 16% were the effect of the treatment, and both were highly significant. An additional 7% were the teachers' effect (nested within treatments), but this effect did not reach statistical significance.

Chemistry is often regarded as a difficult subject, an observation which sometimes repels learners from continuing with studies in chemistry. Ghassan Sirhan (2007) sought, in this paper, to bring together the general findings obtained from research over the past few decades for both school pupils and university students in an attempt to suggest the key reasons for this difficulty. Suggestions are made on ways to minimise the problems based on understandings of attitudes and motivation as well as the psychological understandings of how learning takes place.

Much of the current diversity literature in science education does not address the complexity of the issues of indigenous learners in their postcolonial environments and calls for a “one size fits all” instructional approach. Indigenous
knowledge needs to be promoted and supported. There is currently a global initiative of maintaining worldviews, languages, and environments of which science education can be a part. Cassie Quigley (2007) explained in his paper entitled “Globalization and Science Education: The Implications for Indigenous Knowledge Systems” organized around five main topics that further guide the theoretical framework for this important area: (a) describing post-colonialism and indignity related to science education, (b) defining the terms indigenous knowledge, traditional ecological knowledge, (c) western modern science and the effects of globalization on these terms, (d) examining the research on learning implications of indigenous knowledge (IK) and/or Traditional Ecological Knowledge (TEK) in classrooms with a focus on the research into student learning in indigenous language and (e) connecting place-based education to curricular implications for indigenous knowledge systems.

Ricardo Trumper (2006) conducted as part of the Relevance of Science Education (ROSE) Project, on students' interest in biology at the end of their compulsory schooling in Israel, and its relation to their views on science classes, out-of-school experiences in biology, and attitudes to science and technology, showed that their overall interest in learning biology was relatively positive but not high; girls showed greater interest in it than boys. Students' interest in learning biology correlated closely with their negative opinions of science classes. These findings raise critical questions about the implementation of changes in the Israeli science curriculum in primary and junior high school, if the goal is to prepare the rising generation for life in a scientific-technological era. From deeper analysis of
the results curricular, behavioral, and organizational changes needed to reach this goal were formulated.

Dennis D. Munk, Jana Bruckert, Deborah T. Call, Traci Stoehrmann and Erin Radandt (1998) presented an overview of curricular and instructional adaptations, modifications, and methods that have been used to provide science instruction to students with disabilities. Many special educators have identified science instruction as a particularly useful subject for students with disabilities. A recent increase in the discussion concerning science instruction for such students may stem from general educators' receptivity toward having students with disabilities in science classes, due in part to the perception that science instruction involves more experiential learning and less reliance on reading. Despite such favorable perceptions, both general and special educators struggle to develop and deliver effective instruction in inclusive classrooms. Strategies are described within the context of a textbook-based unit on the solar system.

Joanne F. Carlisle and Victor Chang (1996) determined whether students with and without learning disabilities (LD) who attended general education science classes differed in their evaluations of their learning capabilities, whether changes in self-evaluation occurred over a 3 year period, and whether over this period the teachers' ratings of the students with LD differed from those of the students without LD. Two cohorts of students (including students with and without LD) were followed for 3 years (Grades 4 to 6 and 6 to 8); in each year they and their teachers were asked to evaluate their capabilities and efforts in science. The results showed that the students with LD in the younger cohort rated themselves
as less capable in science than did the students without LD in all 3 years, but the students with and without LD in the older cohort differed only in the first year. For both cohorts, the teachers consistently rated the students with LD as having significantly less adequate learning capabilities, and they placed the students with LD at lower levels of achievement than their peers without LD. Comparisons of student and teacher ratings suggest that teachers often have higher expectations for students than students have for themselves and that the students with LD fall particularly short of these standards. Implications for helping students with LD adjust to learning in general education science classes and for further research studies are discussed.

Gail Grigg Holahan, Jacqueline McFarland and Beverly A. Piccillo (1994) reviewed science curriculum issues surrounding the education of children with disabilities. The Nation’s leadership has expressed serious concern regarding the role of science and mathematics in the education of our children, and children with disabilities cannot be excluded from this interest. They explored the background of science education for children with disabilities and examine three curricula designed especially for children with disabilities: Biological Science Curriculum study, full option science system, and science for all children.

Ogunniyi (1986) has reviewed the nature of science education in Africa and identifies constraints such as rapid enrolment expansion, scarce resources, limited teacher quality and high dropouts as critical. His review of various primary and secondary curriculum innovations of the Science Education Programme for Africa illustrates this. Among the trends in science education he identifies are a
shift in emphasis from rote learning to enquiry activities and from teacher-centred approaches to student-centred approaches; more subject integration; more emphasis on problem-solving; increased student population and crash programmes for the training of science teachers; tertiary admission policies favouring science students; expansion in the teaching of primary science. Yet despite these efforts progress has been hampered by poor teacher preparation, rapid rate of teacher transfer, shortage of qualified science teachers, lack of a reinforcing home background and the 'conspicuous absence of an active involvement of the scientific community'. Ogunniyi is critical of poor planning and the absence of clear-cut policies and he attributes this to the lack of a scientific approach to planning. He calls for curricula which reflect contemporary and emergent needs of the diverse cultures of Africa; examination reform is needed to support the new emphasis on science as enquiry; more involvement of African scientists in science education; less esoteric tertiary science programmes. Major problems in science education therefore remain.

Tisher, Richard P., Ed. (1984) focused on students' science concepts and the alternative frameworks they use to interpret natural phenomena. Among the specific areas investigated are: conceptions held by Year 11 chemistry students about stoichiometry; how some 9-year-old students interpret the word "solid" to mean hard, unbreakable, inflexible, and not-hollow; children's ideas about floating (noting that many believe the top of an iceberg is the only part floating and if it were cut off, the bottom would sink); pre-instructional alternative frameworks that Year 10 students possess in the area of mechanics; post-instructional frameworks of Year 12 physics students following instruction on circular motion;
and chemists’ concepts of acids and bases (suggesting that students’ difficulties in this area may be more usefully perceived in terms of confusion about the models used in teaching the concepts rather than as a conflict between preconceptions and the scientific view). Other studies involve such areas as curriculum development in science by master’s and doctoral students, an examination of authors’ claims in prefaces to science textbooks, effects of an activity-based curriculum on student outcomes in chemistry in Thailand and attitude toward health and knowledge of health issues in nurses, high school students, and primary school students.

2.2.3 Teachers’ Role in Students Learning

Jeffrey Grigg, Kimberle A. Kelly, Adam Gamoran and Geoffrey D. Borman (2013) examined classroom observations from a 3-year large-scale randomized trial in the Los Angeles Unified School District (LAUSD) to investigate the extent to which a professional development initiative in inquiry science influenced teaching practices in 4th and 5th grade classrooms in 73 schools. During the course of the study, LAUSD introduced an additional district wide scientific inquiry professional development initiative, which complicates the experimental analysis but allows us to conduct a quasi experimental analysis of the second Multilevel models predicting the presence of science inquiry in observed classroom lessons show that both interventions increased the incidence of inquiry-based science teaching, but the impact was limited to selected features of the inquiry process. It was also found that the experimental impacts on teaching practice correspond with the features of scientific inquiry to which the teachers were most frequently exposed during the professional development.
Amrein-Beardsley, Audrey; Osborn Popp, Sharon E. (2012) conducted a study on the use of the Reformed Teaching Observation Protocol (RTOP) of teacher educators, a peer observation instrument associated with increases in learning in science and mathematics teacher education courses. Faculty participants received a series of trainings in RTOP use and rated each other's teaching during multiple peer observations. The purpose of this study was to investigate whether the RTOP would prove useful for formative and summative purposes across teacher education courses in general. While participants saw value in the peer observation process and the RTOP instrument, findings suggest that the perceived formative functions of the RTOP outweighed the instrument's summative value.

Linda H. Mason and Laura R. Hedin (2011) discussed the challenges for students with learning disabilities and considerations for teachers. In science classes, teachers must consider the need for explicit, systematic reading instruction for students with learning disabilities (LD) while navigating the constructivist and activity-oriented methods typically employed in science instruction. The complexity of scientific information conveyed through print may make reading science texts the greatest challenge that students with LD encounter in school. Fortunately, researchers have established that, by fostering students' prior knowledge, providing text enhancements, and teaching reading comprehension strategies, students' understanding of science text is improved. Effective instructional approaches and strategies for reading are reviewed and implications for teaching students with LD noted.
Paichi Pat Shein and Wen-Bin Chiou (2011) used modeling advantage, a concept developed by Chiou and Yang (2006), to examine the likelihood that students will identify with a particular teaching model over other competing models. This research examined the effects of 2 kinds of teaching styles on students’ learning styles during the collaborative teaching of technical courses. Undergraduates in a 1-semester course (229 women, 264 men; M age = 20.8 years, SD = 1.5) were given pretests and posttests to investigate how their learning styles related to their teachers’ learning styles. The findings showed that the learning styles of students were associated with their role models, which reinforced Chiou and Yang’s previous work with undergraduates in different subject areas. After a semester, the learning styles of students became congruent with those of their role models. Implications and limitations of the study are discussed.

Rebecca M. Schneider and Kellie Plasman (2011) examined the research on science teachers’ pedagogical content knowledge (PCK) in order to refine ideas about science teacher learning progressions and how to support them. Research published between 1986 and 2010 relevant to science teacher learning and PCK was examined for what ways teachers’ knowledge becomes more developed and what appears to be the sequence. Analysis indicates that it is helpful for teachers to think about learners first, then to focus on teaching, and points out the essential role of reflection for teachers to rearrange their ideas in ways that develop their PCK. This review takes a unique approach to thinking about research on what science teachers learn and can support teacher
educators in designing professional programs that support beginning and advanced learning for science teachers.

Shwu-yong L. Huang and Barry J. Frase (2009) undertook research into the assessment of school environment, differences between female and male science teachers’ perceptions of their school environments and associations between these school environment perceptions and teachers’ background characteristics, because the school environment has been shown to play an important role in teacher and student performance. Although gender differences in science education have attracted both public concern and academic interest, little research has specifically addressed this issue in terms of the school environment. Data were collected from a large sample of 300 female and 518 male science teachers from secondary schools in Taiwan. Statistically significant gender differences were found in most aspects of the school environment, with female science teachers perceiving greater collegiality among teachers, higher gender equity among students, and stronger professional interest, and with male science teachers perceiving lower work pressure and better teacher–student relations. Gender differences in science teachers’ perceptions of collegiality, work pressure, and gender equity in the school environment persisted even after controlling for teachers’ background and school characteristics. Among the implications are recommendations about administrative policy for improving the school environment for both male and female teachers and about future research on factors associated with teachers' perceptions.
Suleyman Dogu, Muhittin Dinc and Ali Meydan (2007) revealed the difficulties which science teachers face during the second stage of primary school. The survey collected and developed from literature knowledge has been applied to 121 science teachers working at elementary schools which being to the Provincial Education Directorate of Konya in Turkey. The data obtained from surveys have been assessed and interpreted in the program of SPSS Windows. The result of the survey has revealed that in science instruction, science teachers experience difficulty in that they can't provide materials, that the materials they use are not suitable for students level, that they can not use up-to-date knowledge and instructional methods and techniques adequately in lessons. The result of the research indicate that teachers complain about insufficiency of physical structure of the school and the negative effects participating in the survey have expressed about students that parents are not concerned about their children and student have negative attitude for the lesson and teacher.

Kevin D. Finson (2006) assessed nine middle grades teachers' teaching styles in their study using the Draw-a-Science-Teacher-Teaching Test Checklist (DASTT-C) and categorized along a continuum from didactic to inquiry/constructivist in orientation. Students' (n = 339) perceptions of scientists were determined using the Draw-a-Scientist-Test Checklist (DAST-C). Teachers' teaching styles and their students' perceptions of scientists were then compared using nonparametric correlational methods. Results showed that no significant correlation existed between the two measures for the population studied. Although the study provides no understanding about when or how relationships developed between teachers' teaching styles and students' perceptions of
scientists, trends in the results give rise to some concerns regarding the preparation of future science teachers and the in-service development of practicing teachers.

Carla C. Johnson (2006) focused on two middle schools in the central US who participated in collaborative, sustained, whole-school professional development in implementing inquiry as part of National Science Education Standards, or standards-based instructional practices. Participants were involved in their second year of the professional development experience. The research question explored was, “What barriers do science teachers encounter when implementing standards-based instruction while participating in effective professional development experiences?” Qualitative data collected in the form of teacher interviews and classroom observations were utilized and were analyzed using a barrier to reform rubric. Findings indicate that even with effective professional development, science teachers still encounter technical, political, and cultural barriers to implementation. More support is required for professional development efforts to be successful, such as resources and time, as well as administrative buy-in and support. Findings also revealed that even the best intended professional development efforts do not reveal and address existing beliefs for all teachers. Implications for future science education reform stakeholders are discussed.

Grumbine R, Brigham Alden P (2006) outlined the basic educational principles and practical examples that teachers can use to improve the learning environment and motivation of these students. Between 5% and 10% of all K-12
children are identified as having a learning disability, and 36% to 56% of these students leave high school without a diploma. Because of inclusive practices and new identification procedures, the number of LD students in science classes is now increasing, but many science teachers have little experience in identifying and meeting the needs of these students. The authors of the article created a set of six principles to help science teachers serve LD students more effectively. The principles are based on a review of science teaching and special education literature, as well as on the authors’ personal experiences at a school designed for LD students. LD students benefit when instructors accommodate teaching to a variety of learning styles by representing content in diverse ways and using multiple means of assessment. Explicit instruction in strategies for planning, prioritizing and time management, which can be overwhelming for LD students, can also be helpful. Furthermore, explicitly organized instruction and assessment can help students plan, prioritize, and set goals. Instruction and assessment should be based on clearly stated objectives which are easily available and frequently mentioned. Students are more motivated when teachers provide consistent feedback and self-assessment information. This information is especially important for LD students because they have a tendency to falsely estimate their academic abilities. The recommendations of the study are:

Principle 1: Provide instruction that reaches the full spectrum of diverse learners-
- Provide various means of assessment that capitalize on students’ learning strengths or preferences.

Principle 2: Teach and model reading and study strategies-
- Teach effective ways to organize, revise, and review notes
- Teach the structure of lab report writing by providing models and templates
- If the recall of vocabulary is important, then teach and model review techniques

Principle 3: Teach foundational concepts and core science skills-
- Teach science concepts and procedures for a variety of learning styles.
- Provide opportunities for students to demonstrate understanding in diverse ways.

Principle 4: Encourage students to self-assess and take ownership of their learning-
- Provide opportunities for students to reflect on their learning progress.
- Encourage students to take ownership of their learning by setting personal goals.

Principle 5: Foster a supportive learning environment-
- Create a supportive learning environment that encourages students to take risks and learn from mistakes.
- Foster positive relationships between students and teachers.

Principle 6: Collaborate with special education professionals-
- Collaborate with special education professionals to ensure that students receive appropriate support in their learning.
- Foster a culture of collaboration and professional development among science teachers and special education professionals.
students to use some form of course planner or calendar that shows assignment due dates in a clear, graphical format-Consider giving students the option of leaving their course materials in the classroom to minimize loss of handouts and notes. Principle 3:-Post and review daily agendas for all class activities and assignments-Establish and rationalize a routine for how class operates -Distribute all important assignment handouts in the same format and structure. Principle 4:-Make a direct connection, orally and in writing, between each class task and its associated learning objective-Provide scoring rubrics that describe the qualities of excellent work for the various components of each assignment-Provide (or assign) some form of study guide for students to review before any quiz or exam. Principle 5:-Instead of relying on large unit tests or exams, build in more frequent forms of assessment-Use grade-keeping software and make updated grade reports accessible to students -Provide direct personalized feedback to students. Principle 6:-At the beginning of a course, have a conversation about the value of understanding one’s learning profile and/or let students take a learning style survey -Explicitly share with students your observations about their learning strengths and challenges.

Kumar,M. (2003) examined the effectiveness of certain instructional strategies to overcome learning difficulties in Arithmetic at secondary school level. The objectives of the study are: (i) To develop diagnostic test and study the errors committed by the children with arithmetical difficulties in addition, subtraction, multiplication and division; (ii) To study significant difference if any in the effectiveness of among different instructional strategies (CATL, MSTL, SGTL and CT) on the post-test and retention test achievement of CAD; (iii) to study
significant difference if any in the post-test and Retention test achievement of CAD taught through different instructional strategies (CATL, MSTL, SGTL and CT) with regards to sex, family income, parents’ educational qualification, and family size; (iv) to study significant relationship if any between span of attention and span of memory of CAD in post-test and retention test achievements. Major Findings of the study are: (i) There was significant difference post-test performance of learners than pre-test by using instructional strategies such as CATL, MSTL, SGTL, CT retention test and achievement of CAD, (ii) There was no significant difference in retention test performance to learners in CATL group due to the variation in the background variables such as sex, parent’s educational qualification, family income and size of the family, (iii) There existed positive relationship between retention test scores of children with arithmetic difficulties and their span of attention, (iv) There was significant relationship between retention test scores and span of memory, (v) There was significant positive and high correlation between achievement and span of attention.

Krishna Kumar,K.N. (2003) conducted a critical study on learning disabilities in mathematics at secondary school level. The objectives of the Study: (i) The specific objectives of the study are to identify children with learning disabilities in mathematics at secondary school level. (ii) To study children with Learning Disabilities in mathematics with reference to the difficulties that they encounter in learning mathematics. (iii) To study the mathematics teacher’s observations about the mistakes/difficulties that the children with learning disabilities in mathematics commit. (iv) To find the various causes for committing mistakes or facing difficulty in mathematics among these children. (v) To suggest
remedial measures to overcome difficulties in mathematics among children with learning disabilities. (vi) To suggest intervention programmes to minimize the mistakes committed by the children. The Major Findings of the study are: (i) At the end of first intervention the mean of mistakes committed was 43.2, which was less than the mean before intervention that was 57.58, (ii) After second intervention the mean of mistakes was 19.94 and after third intervention the mean of mistakes committed was further reduced to 5.7, (iii) The results show that children with learning disabilities in mathematics commit mistakes in learning and solving mathematics, (iv) The study also revealed that appropriate intervention programme designed for the children with learning disabilities in mathematics will help the children to overcome the mistakes committed by them.

Yakaiah Podupuganti (2002) made an investigation to identify children with learning difficulties and to develop an intervention strategy. This investigation was designed to identify children with learning difficulties from standard I to IV who had difficulties in learning to read, write and/or arithmetic. The major concern of the study was to work with children who are already on rolls in various schools. Objectives of the study: (i) To develop a checklist for screening to identify children with learning difficulties, (ii) To study the magnitude of children with learning difficulties among primary schools, (iii) To analyse the nature of reading, writing and arithmetic learning difficulties of primary school children, (iv) To find out the difference between verbal and performance scores of intelligence of children with learning difficulties, (v) To find out the grade level of children with learning difficulties, (vi) To study the nature of complaints reported by teachers among the children with learning difficulties. (vii) To study the impact of certain
socio-economic correlates on learning difficulties. (viii) To develop an intervention programme to help the children with learning difficulties for better achievement in reading, writing and arithmetic and (ix) To study the academic achievement of children with learning difficulties before and after intervention programme. The hypotheses are: (i) There is no impact of socio-economic correlates with the magnitude of learning difficulties; (ii) There exist certain learning difficulties in reading, writing and arithmetic areas, which are common for most of the children with learning difficulties. (iii) There exists a significant difference between verbal and performance scores of intelligence among children with learning difficulties, (iv) There will be betterment in the grade level of children with learning difficulties after intervention, (v) There is no significance of difference between the academic achievement of the children with the learning difficulties before and after intervention. The significant findings of the study are: (i) Fourteen percent of children have learning difficulties among primary school students. (ii) Most of the children face difficulties in Reading, followed by Arithmetic and Writing areas. (ii). There are some specific difficulties occurring most frequently which are common for many of the children with learning difficulties. (iv) Grade level of the children with learning difficulties improved after intervention. (v) Complaints reported by teachers about the learning difficulties of the children were more specific after intervention. (vii) There is a significant difference between verbal and performance scores of intelligence of the children. The mean performance intelligence scores are better than that of their mean verbal intelligence scores. (vii) Achievement of the children after intervention is better than that of their achievement before intervention in all the three areas – Reading, Writing and
Arithmetic, (viii) Correlation among achievement in Reading, Writing and Arithmetic improved after intervention.

Kusuma Harinath, P. (2001) found certain factors related to learning disabilities in English among school students. The objectives: (1) To identify the number and percentage of students with reading, writing and spelling difficulties in English; (2) To study the intelligence, personality-based difficulties; (3) To study awareness of the study in reading, writing, spelling; (4) To study the awareness of parents and teachers towards the learning difficulties of the students. Major Findings of the study are: (1) The study revealed that 2380 students of Classes VI and VII, 243 students were identified as students with learning difficulties in English. (2) Most of the students with learning difficulties had low level of intelligence. (3) It was found that boys experience more learning difficulties than girls. (4) Parents’ occupation influences reading difficulties. (5) Rural students had more learning difficulties. (6) No parent had any awareness in education. (7) There was a significant relationship with parents’ attitude.

Carolyn W. Keys, Lynn A. Bryan (2001) assert a potential research agenda for the teaching and learning of science as inquiry as part of the Journal of Research in Science Teaching (JRST) series on reform in science education. Drawing on the theoretical frameworks of cognitive and socio-cultural constructivism, cultural models of meaning, the dialogic function of language, and transformational models of teacher education, we propose that more research is needed in the areas of teachers' beliefs, knowledge, and practices of inquiry-based science, as well as, student learning. Because the efficacy of reform
efforts rest largely with teachers, their voices need to be included in the design and implementation of inquiry-based curriculum. As we review the literature and pose future research questions, we propose that particular attention be paid to research on inquiry in diverse classrooms, and to modes of inquiry-based instruction that are designed by teachers.

Alice Mathew (2000) conducted a study to know the effectiveness of self-instructional materials and modern instructional strategies in minimizing learning disabilities of students in secondary schools. Objectives relevant to the present study are: (i) To find out the effect of programmed learning, supervised learning module and the guided inductive inquiring model on the achievement of biology of secondary school students with learning disabilities. (ii) To find out the effect of programmed learning, supervised learning module and the guided inductive inquiry model in comparison with that of the conventional lecture demonstration method in minimizing the learning disabilities of secondary school students in learning biology. (iii) To compare the achievement of learning disabled students and ND students when they are taught biology using programmed learning material, supervised learning module and guided inductive inquiry model. (iv) To compare the progress in the achievement of LD students and ND students when programmed learning material, learning module and guided inductive enquiry model are adopted for teaching. The hypotheses are: (i) There is no significant difference in the initial and final achievements of the secondary students with learning difficulties when self-study approach and modern instructional strategies are adopted for their teaching. (ii) The self-study approach and the modern instructional strategies do not differ significantly from the conventional lecture
demonstration method in their effectiveness in minimizing the learning disabilities of the secondary school students. (iii) The self study approach and the modern instructional strategy do not differ significantly from the conventional lecture demonstration method in the achievement of non-disabled students of secondary school students. (iv) The progress of the learning disabled (LD) students of the self study approach and modern instructional strategy groups do not differ considerably from the achievement of the learning disabled students and the non-disabled students. The major findings of the study: (i) The SIM and modern instructional strategy are effective in the achievement of biology for grade IX learning disabled and Non-disabled students. (ii) The SIM and modern instructional strategy are more effective than the conventional lecture demonstration method in the achievement in biology of learning disabled and non-disabled students. (iii) The SIM and modern instructional strategy are effective for significantly higher progress in the achievement in biology by the learning disabled and non-disabled students.

Andrew T. Lumpe, Jodi J. Haney, and Charlene M. Czerniak (2000) interviewed with 130 purposefully selected teachers resulted in 28 categories of environmental factors and/or people who were perceived to influence science teaching. These categories were used to develop items for the Context Beliefs about Teaching Science instrument and provided evidence for content validity. Construct validity was partially confirmed through factor analysis that resulted in 26 items and two subscales on the final instrument. Using Ford’s Motivation Systems Theory and Bandura’s Theory of Collective Efficacy, additional evidence for construct validity was found in the modest correlation of context beliefs with
outcome expectancy beliefs and the low correlation with science teaching self-efficacy beliefs. The instrument was tested using 262 teachers participating in long-term science professional development programs. These teachers possessed fairly positive context beliefs and, according to Ford’s theory, should be capable of effective functioning in the classroom. It was concluded that the assessment of context beliefs would complement current science teacher self-efficacy measures, thereby allowing researchers to develop profiles of science teachers’ personal agency belief patterns. It could also be used to determine the factors which predict particular personal agency belief patterns, and assess teachers’ perceptions of the strengths and weaknesses of school science programs, and could be used in planning and monitoring professional development experiences for science teachers.

Barbara A. Crawford (2000) suggested a myriad of constantly changing teacher roles that demands more active and complex participation than that suggested by the commonly used metaphor, teacher as facilitator. The authors expressed that if we are to avoid the failures of our past related to giving teachers teacher-proof curriculum, we need to turn our attention to how best to support teachers in embracing the essence of inquiry.

Norman G. Lederman (1999) investigated the relationship of teachers’ understanding of the nature of science and classroom practice and to delineate factors that facilitate or impede a relationship. Five high school biology teachers, ranging in experience from 2 to 15 years, comprised the sample for this investigation. During one full academic year, multiple data sources were collected.
and included classroom observations, open-ended questionnaires, semi-structured and structured interviews, and instructional plans and materials. In addition, students in each of the teachers’ classrooms were interviewed with respect to their understanding of the nature of science. Using analytical induction, multiple data sources were analyzed independently and together to triangulate data while constructing teacher profiles. The results indicated that teachers’ conceptions of science do not necessarily influence classroom practice. Of critical importance were teachers’ level of experience, intentions, and perceptions of students.

Margo A. Mastropieri, Thomas E. Scruggs, and Madeline Magnusen, M.S., (1999) reported the findings of several extended classroom investigations in science education that include students with disabilities. In all cases, certified teachers implemented the science instruction over extended time periods to their students with and without disabilities. Additionally, in all cases science curricula were adapted as necessary to promote the successful participation and learning of students with disabilities. In some applications, teachers generated the adaptations in consultation with university researchers. In other cases, teachers generated ideas more independently. In all implementations, activities-based curriculum materials were used solely or in combination or comparison with textbook-based curriculum materials. Findings across all classroom implementations suggest that students with disabilities successfully learned more when taught with the adapted activities-based science curriculum materials. Additionally, students with disabilities overwhelmingly reported enjoying the activities-oriented instruction more than textbook instruction. Teachers noted that
during activities-oriented instruction students appeared more motivated to learn and to participate in class, and demonstrated more on-task behaviors. However, teachers also reported that activities-oriented instruction involved considerably more teacher preparation time, behavior management skills, and organizational skills than traditional textbook instruction. Findings are discussed with respect to instructional implications for students with disabilities.

Chel.M.M. (1990) examined the problem of under achievement in compulsory mathematics in the Madhyamic Examination of West-Bengal. The results showed the following causes responsible for under achievement namely: gaps in knowledge of concepts, difficulties in understanding of Mathematical Language, lack of openness and flexibility in teaching, difficulty in mathematisation of verbal problems and interpretation of mathematical results. In addition to this the abstract nature of mathematics, fear and anxiety on the part of the students was also some of the other reasons.

Sudheer Reddy.K.S. (1988) investigated learning disabilities among primary school children. The results showed that the non-learning disabled children performed better in memory serial learning and passed associate learning. Gender, had no impact on the performance of the children birth order influenced the performance of non-learning disabled students. Type of family also had impact on the learning among non-learning disabilities non-disabled children from nuclear family performed better. Mother’s occupation had a positive correlation to the memory performance in both learning disabilities and non learning disabled children.