CHAPTER III

REVIEW OF RELATED LITERATURE AND STUDIES

Studies related to Science Process Skills

Studies related to Learning Disability
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A review of the related studies implies locating, reading and evaluating reports of research as well as reports of observation and opinion that are related to the individual's planned research project. According to Mouly (1963), "The investigator can be sure that his problem does not exist in vacuum, and that considerable work has already been done, on problems which are directly related to his proposed investigation. The success of his efforts will depend in no small measure, on the extent to which he capitalises on the advances – both empirical and theoretical – made by previous researches".

According to Turney and Robb (1971), "The identification of a problem, the development of a research design, and determination of the size and scope of the problem, all depend to a great extent, on the care and intensity with which a researcher has examined the literature related to the intended research".

The present study is an effort to find out the effect of deficit in scientific skills on achievement in science of the learning disabled at primary level. As there were few studies related to learning disabled children, a look into the studies related to the relationship between science process skills and
other variables of normal children is worthwhile for the present study. The studies reviewed are given below.

**STUDIES RELATED TO SCIENCE PROCESS SKILLS**

Dasbach (1968) studied the effects of Science-A Process Approach (SAPA) and contemporary mathematics on teachers and pupils. Three school groups were identified. (a) school using both Science-A process approach and contemporary mathematics. (b) schools using only Science-A Process Approach (3) schools using only contemporary mathematics. It was found that pupils given the mathematics sequence patterned after Science-A Process Approach scored higher on the science achievement test. Thus he concluded that greater achievement in science can be expected of a carefully planned mathematics sequence that precedes the science lessons.

Pohlman and Pappelis (1977) showed that many general studies (non science) students were unable to pass several of the individual competency measures in the Science-A Process Approach (SAPA) curriculum beyond the second grade level. However, after instruction with materials from the SAPA curriculum, the process skills of these students were greatly improved. The study reported significant gains on the Test of Science Processes, which was used as a pre-test and post-test in addition to improvement noted on SAPA individual competency measures.

Doran and Sellers (1978) studied the relationship between students’ self-concept in science and their science achievement, mental ability
and gender. The study found that mental ability is related to process achievement. However, the relationship was not strong as biology achievement and mental ability together accounted for only nine per cent of variance in process skill achievement.

Andrew (1980) constructed a group test to evaluate secondary school pupils’ skill in scientific process. Various skills and their components were determined. Analysis of the test scores lead to the conclusion that the science process skills and the intelligence of the pupil are related. The study also found that girls are superior to boys in skills in scientific processes.

Pettus and Haley (1980) made a study to determine if there were relationships among the science process skill levels of high school students and their classifications according to sex, age, grade level, number of completed science courses and interest in science careers. The study found that there is relationship between students’ overall science process skill levels and the combined effects of sex, age, grade level, interest in a science career and number of science courses completed. It was found that there is a strong relationship between age and the process skill of classifying indicating that the combination of maturation and experience is important to the ability to classify. A relationship also existed between grade level and the ability to experiment and to a lesser extent between grade level and the ability to infer.

Haukoos (1981) examined the effects of two different classroom climates (discovery and non-discovery) on learning science processes and content. Results indicated that students in the discovery treatment scores
significantly higher on the science process skills. Personality characteristics with significant interactions with science process were achievement, order autonomy, affiliation, interception and abasement.

Hough and Piper (1982) explored the relationship between attitude towards science and science achievement. Significant relationship was found between the pupils' process scores and attitude scores ($r = 0.45$).

Morales (1982) determined the rate of improvement of selected mentally handicapped students to comprehend two basic scientific processes—Serial addressing and Pattern building. The study found that modelling is an effective method to teach serial ordering and pattern building to their group of mentally handicapped children. Use of materials and concrete objects for teaching science processes to mentally handicapped children seemed effective.

Newton (1982) examined the effect of enhanced levels of generalising and planning engagement on integrated process skill achievement in grade 7-8 science students of varying ability levels. The results showed that the level of student planning is significantly associated with process skill achievement, even when the formal reasoning ability of the student is considered. Student generalising is also significantly associated with process skill achievement, but not when formal reasoning ability is considered.

Walkoz and Yeany (1984) compared the process skill achievement of students completing traditional laboratory exercises with
students not only completing the same exercises but also receiving instruction in such integrated process skills as identifying variables and stating hypotheses. Results indicated that emphasis on process skills in the laboratory can significantly improve process skill achievement. Students with lower levels of cognitive development had a lower level of process skill achievement.

Bhargava (1986) made an attempt to study the process of measuring which the pupils are required to develop for acquiring scientific knowledge at the school stage. The relationship between the scores on the process of measuring and other variables such as pupil’s residence, sex, age, intelligence, SES, and achievement in Physics was also determined. The study found that the relationship between the performance on the process of measuring and intelligence ($r=0.308$) and achievement in Physics ($r=0.377$) are positively and significantly correlated.

Menon (1986) in his study found that the overall proficiency in the process skills steadily increased as students went up from standard to standard.

Poulose (1987) examined the influence of certain personality variables, sex and residence on process outcomes in physics of university entrants. The study found that the F-value corresponding to the main effects of personality variables were significant in the case of four out of the nine variables. Sex and residence of the subjects were also found to have a
significant influence on process outcome. Males were seen to be superior to females in their process achievement.

Lobo (1990) found that the teacher students who possess science process skills were able to improve pupils' achievement through their modified behaviour. It was also found that as a result of process skills teaching, teachers tend to be more heuristic, problem solving oriented and speculative in contrast with those who are not given this training.

Ampili (1991) in her study assessed separately the possible relationship of process outcomes in science to science interest, scientific attitude and attitude towards academic work of total sample and relevant subsamples. She found a positive and significant relationship between process outcomes and science interest, scientific attitude and attitude towards academic work.

Singh and Black (1991) conducted a study to find out the effects of task contexts on pupils' performance in science process skills. The study found that there exist an apparent interaction between process skills and contexts. Pupil's achievement on the interpretation skills was significantly higher in everyday contexts than in scientific contexts, whereas in application skills, it was significantly higher in scientific contexts.

Suresh (1991) tried to identify the sociological, cognitive and environmental variables related to process outcomes in biology. It was concluded from the study that process outcomes in biology could be predicted by employing four independent variables viz., intelligence, and science
learning approach, parental education and parental income. These predictors were found to be positively and significantly related to science process outcome.

Mathis (1992) found a moderately strong and almost identical correlation between the reasoning skills as measured by the group assessment of logical thinking and integrated process skills measured both for each sample. The results implied a relationship between reasoning and process skills of junior high school students.

Manor (1993) in his study on reasoning strategies of students in solving chemistry problems as a function of developmental level, functional M-Capacity and disembedding ability finds out that achievement in science depends among other factors on hypothetico-deductive reasoning ability; that is, on the developmental level of the students. Recent research indicates that developmental level of the students should be studied along with individual difference variables such as Pascual-Leone’s M-capacity (information processing) and Witkin’s Cognitive Style (disembedding ability). Results also show that students who scored higher on cognitive predictor variables not only have a better chance of solving chemistry problems but also demonstrated greater understanding and used reasoning strategies indicative of explicit problem solving procedures based on the hypothetico-deductive method, manipulation of essential information and sensitivity to misleading information. It was also observed that students who score higher on cognitive predictor variables tend to anticipate important aspects of the problem
situation by constructing general figurative and operative modes leading to a greater understanding. Students scoring low on cognitive predictor variables tended to circumvent cognitively more demanding strategies and adopt others that helped them to overcome the constraints of formal reasoning, information processing and disembedding ability.

Germann (1994) found that academic ability, biology knowledge and language preference had significant direct effects on science process skills achievement. There were significant mediated effects by cognitive development, parents' education and attitude towards science in schools. The variables of cognitive development and academic ability had the greatest total effects on science process skills.

Hykle (1994) in his study found that the achievement in science and achievement in science process skills are significantly related.

Kok-Anutoh and Bryan (1994) examined the generalisability of science process skills for students carrying out whole investigations, using a sample of 135 eighth graders in Singapore. The study revealed that the skills of preliminary trials, planning, communicating and interpreting are generalisable.

Ahuja (1995) made a study to determine whether the use of a co-operative learning instructional strategy would influence the academic achievement, attitudes towards science class and process skills of middle school science students. Findings of the study indicated that the use of a co-
operative learning instructional strategy resulted in greater academic achievement and better attitudes towards science class of the students. The process skills were not influenced by instructional strategy.

Germann (1996) found that explicit, incremental development of the science process skills of formulating hypotheses and identifying variables together with model examples may be a means to facilitate student success in designing science experiments.

Tice (1999) investigated the student science achievement results related to the infusion of an elementary process science program into a rural suburban school district which had already implemented a process curricula in language arts and mathematics. It ascertained trends in student science content and process skill achievement during the four years following the curricular innovation. The study revealed that there was significant increase in student science achievement scores from the onset to the conclusion of the study. The achievement scores of the content, inquiry skill and manipulative skill subtests over the course of the study demonstrated significant changes when students attainment of science mastery was examined. Additionally this study determined that the students who were exposed to process Mathematics approach as opposed to traditional Mathematics program also collectively demonstrated improved performance in all sub-test areas.

Dawson (2000) designed a study to test the hypothesis that there is a significant, positive correlation between science process skills and
correct understanding in Photosynthesis and that students who received explicit instruction in science process skills, then used skills in a laboratory exercise designed to promote conceptual change would have fewer misconceptions than students who did not. Results indicated that there was a significant positive correlation between science process skills and understanding of photosynthesis. The science process skill of hypothesising showed the strongest correlation, while that of prediction had the weakest. The author found no significant effect on understanding of the concepts of photosynthesis due to either explicit instruction in science process skills or to performing an inquiry-based laboratory designed to point out these misconceptions.

Joseph and Suresh (2001) in their study tested the ability of the select affective variables-attitude towards science learning and science learning interest-to discriminate among three levels of process achievement in Physics and the extent of relationship of these variables with process outcomes in Physics. It was found that the select affective variables could discriminate significantly among high, average and low process achievers and they have positive significant correlation with process outcomes in Physics.

STUDIES RELATED TO LEARNING DISABILITY

Singh (1981) conducted a study on the effects of peer tutoring in Mathematics skills of learning disabled students. Results indicated that peer-tutored group of LD students made significant gains in both mathematics
computation and mathematics concepts application scores compared to non-peer tutored students.

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.

Ryan (1989) made a comparative study of 16 learning disabled and 16 non-disabled children of eighth grade of similar intelligence. He compared the achievement levels, skill mastery rates, learning strategies and attitudes of these children. The course was individualised so that each subject had access to a set of materials. The results indicated that the learning disabled with reading disability could master computer literacy skills in the regular classroom environment if given the opportunity to ask questions to teachers and peers.

Peterson (1989) evaluated the generally recommended concrete-to abstract hierarchy for presenting a new skills with three learning disabled children in grade 1, 2, and 4. Following collection of baseline data, place value concepts and skills were taught using a concrete, semi-concrete and abstract teaching sequence in a direct instruction model. Instruction was limited to 15 minutes a day for 9 to 15 days. Student progress was monitored using student behaviour charts. Post-test results indicated significant gains by all three subjects, with retention demonstrated three weeks later in a
different classroom setting. Findings showed that for all three students, the transition to abstract understanding occurred suddenly and conclusively but at varying points within the concrete-to-abstract sequence.

Kathleen (1991) analysed the memory of specific learning disabled readers using the California Verbal Learning Test for Children. A group of 73 normal children (ages 8 to 10) was compared to 49 age-matched developmentally dyslexic children of average intelligence on the California Verbal Learning Test for Children (CVLT-C), to determine if reading disability was associated with impaired verbal memory. Dyslexics differed significantly from the control group on 9 of the 12 CVLT-C memory measures, with a 78 percent rate of overall correct classification. The total number of words recalled across learning trials appeared to be the most sensitive index. Results indicated that learning-disabled readers and normal children had the same rates of verbal learning, forgetting, and memory development, and were equally able to utilise semantic categorization. Reduced memory efficiency in dyslexia appears to result from verbal encoding difficulties rather than memory deficit per se.

Hall (1991) in her study investigated the process of teaching reading to 12 second-and third-grade learning disabled children in mainstream classrooms and resource rooms. The study focused on how the process of achieving intersubjectivity in a routine task like reading takes place and how the construction of intersubjectivity (referred to as scaffolding) can
vary as a result of the teacher norms being brought to the task. Transcripts of teacher-child interaction were coded according to Vygotskian principles. Resource teachers were found to apply these principles more consistently than mainstream teachers. As a result, resource teachers had longer interactions with children in which they made more adjustments that catered to a reader's zone of proximal development. Students in resource rooms were also more likely to have successful reading episodes and were more likely to initiate interaction. It is concluded that resource room teacher-child interactions were longer because mainstream teachers persisted in the use of the recitation model of teaching to a greater extent than did resource teachers, and because mainstream classroom settings used a more hierarchical physical arrangement of space and the teacher's position. It is suggested that resource rooms are more effective in supporting learning-disabled children academically.

John and Rattan (1991) conducted a study on Short Term Memory (STM) tests as predictors of reading achievement of learning disabled and educable mentally retarded students. They examined nine measures of short-term memory used by school psychologists with a group of learning disabled (N = 48) and educable mentally retarded (N = 34) special education students. Results indicated that not all STM tasks were significant predictors of reading. Sentence memory task was best predictor for learning disabled students whereas letter sequence task was best predictor of reading for educable students.
Ferre and Ferre (1991) evaluated the effects of individualised social skills training sessions with rural elementary learning disabled students. Four third grade students with learning disabilities, poor interpersonal skills and low-esteem participated in weekly individual social skills training. After five weeks, all students showed improvements in peer acceptance and social and general self-esteem and two to three students showed improvement in attention and academic self-esteem.

Nelson (1992) tried to assess the effects of teaching a summary skills strategy to students identified as learning disabled on their comprehension of science text. Effects of a summary skills learning strategy on the comprehension of science text were examined with five elementary age urban minority students with learning disabilities participating in a summer remedial program. The strategy produced clear improvement in comprehension which was associated with similar improvements in the completeness of the written summaries.

Coleman (1992) compared the similarities in the social competencies of learning disabled and low achieving elementary school children. Eighty-five children with learning disabilities in grades 3-6 were compared to match low achieving (LA) peers. Results indicated that the two groups were comparable on most social competence measures, although LD children reported themselves less lonely than LA children, and regular class children rated LD children more likable than LA children.
Vallies (1992) compared the oral and written testing of primary aged mainstreamed learning disabled students. The study compared the performance of four mainstreamed learning disabled students on oral and written tests in social studies. The study found superior test performance during oral testing replicated across all four students. She also suggests procedures for implementing oral testing by classroom teachers.

Merrell and Merz (1992) studied the effect of service delivery model on the social-behavioural competence of learning disabled students. This study compared regular education teacher evaluations of the social competence of elementary children with learning disabilities (N = 68) receiving services in either traditional “pull out” models or in “integrated” programs. It found that service delivery model alone without any specific planned social-behavioural interventions did not have a significant effect on student social competence.

Lorsbach and Frymier (1992) made a comparison of learning disabled and non-disabled students on five at-risk factors, viz., personal pain, family socio-economic status, family instability, family tragedy, and academic risk. This study compared 1,356 students with learning disabilities and 17,431 non-disabled students in grades 4, 7 and 10 on at-risk factors and number of school interventions. The study found that learning-disabled children were significantly more at risk on personal pain, family socio-economic status, family instability, family tragedy, and academic risk.
In a study to measure the writing language abilities of learning disabled and non-disabled children, Watkinson and Lee (1992) examined the differences in written expression between learning disabled and non-disabled middle school students matched by grade and sex, using eight curriculum-based measures. All of learning-disabled students had been identified as having written language deficits. Non-disabled students showed superior written expression skills, especially on production-independent measures.

Scott and Greenfield (1992) conducted a comparative study of normally achieving, learning disabled and mildly retarded students on a taxonomic information task. The sample consists of 100 students in the age group of 6-8. They described the similarities and differences among exemplars of different categories, identified the categories, and named the exemplars. Large performance differences were found between mildly retarded and learning-disabled groups while small performance differences were found between normally achieving and learning-disabled students.

Graham (1992) explored the role of production factors in learning disabled students' compositions. He studied the effects on quantity and quality of student compositions of mechanical interference, rate of production and contentless production signals to write more. The sample of the study consisted of 24 learning disabled fourth and sixth grade students. Results of the study indicate that learning disabled students' writing problems are partly a result of difficulties with mechanics and sustaining production.
Wees (1992) made use of some successful learning strategies to use with gifted learning disabled students to identify the effects of it over regular classroom teaching. This special class programme was conducted on a sample consisting of children in the age group 9 to 12. The program has evolved over its 4 years to stress kinesthetic, experiential learning. The issue of remediation versus enrichment was resolved when it was found that the students responded best to whole theme programming, with remedial instruction provided as problems arose. Most students preferred to learn kinesthetically, as well as orally-expressively, and showed great enthusiasm for drama, art, and science. Independent projects were set up using Benjamin Bloom's categories of thinking as well as timelines and outlines for structure. Much of the program focused on simulations which provided the students with a sense of experiential learning. Simulations included designing a dream home and a mock trial. Other strategies used included high interest, low vocabulary books; journal writing; experiential mathematics; and help in self-organisation. Problems with the program involved consistency with home programs, limited classroom space, and lack of a computer. The findings showed that learning disabled students showed a marked improvement in their overall performance.

Chiodo (1993) prepared a resource/consultative delivery model to increase the academic achievement of second grade learning disabled students. The resource/consultative model in place of a pullout model that was failing to meet the needs of second grade students with specific learning
disabilities, at-risk students, and regular and special educators. This involved conducting team meetings, increasing faculty awareness, and implementing curriculum-based assessment. Informal consultation services were provided and workshops were held to explain and provide instructional assistance in implementing the model. A team was developed to establish schedules for in-class remediation, direct service, and consultation. In-class remediation progressed from teacher-directed activities, through SLD teacher-directed activities, to shared planning on unit presentations. Results showed that students within the targeted classroom showed improvement in academic achievement. Teacher evaluation forms indicated positive acceptance of the model and faculty voted to incorporate the model into the school's improvement plan.

Scott (1993) in her study tried to identify the rhyming skills differentiating among mildly mentally retarded, learning disabled, and normally achieving students. This study of children between ages 6-8 found that the rhyming ability of normally achieving students (N=33) and students with learning disabilities (LD) (N=33) was much higher than that of students with wild mental retardation (MMR) (n=33). Most of the LD children could generate rhymes while most of the MMR students could not generate rhymes.

Carlisle and Andrews (1993) in their study tried to find out how mainstreamed learning disabled students cope with their science classes. This study found that mainstreamed fourth and sixth grade students with
learning disabilities had significant weaknesses on a science curriculum-based assessment relative to non-disabled peers, and they rated themselves and were rated by their teachers more negatively. Mismatches were revealed in the perception of the student and teacher regarding student adjustment and classroom habits.

Swanson (1993) made an attempt to study individual differences in working memory learning disabled and skilled readers. Models of working memory were compared in two experiments as means of explaining variance in the comprehension of 95 skilled and 80 learning-disabled readers from grades 4 through 7. Results suggest that learning-disabled children's working memory problems are functionally related to higher order processes and not memory alone.

Chittooran (1993) identified the factor structure of psychoeducational and neuropsychological measures of learning disabled children. The tests administered were Wechsler Intelligence Scale for Children-Revised, Halstead-Reitan Neuropsychological Battery, Peabody Picture Vocabulary Test and Wide Range Achievement Test. The sample consisted of 934 learning-disabled students between ages 8 and 16. Principal-components analysis with Varimax rotation indicated existence of seven factors: Verbal Reasoning, Academic Achievement, Visual-Perceptual Organization, Development, Visual-Motor Speed, Spatial Memory, and Attention and Concentration.
Berk and Landau (1993) in their study on private speech of learning disabled and normally achieving children in classroom academic and laboratory contexts found that learning-disabled children used more task-relevant private speech than normally achieving classmates during academic seatwork. This was more pronounced for those LD children with attention-deficit hyperactivity disorder.

Swanson (1993) conducted a study on the information processing analysis of learning disabled children's problem solving. The sample for the study consisted of 32 learning disabled, 17 gifted and 14 normally achieving students from grades 4 and 5. Results reveal that learning-disabled children's problem-solving performance reflects a weak integration of metacognitive skills with online processing and problem solution.

Cancelli (1993) investigated the type of instruction and the relationship of classroom behaviour to achievement among learning disabled children. They observed relationships between classroom behaviours and achievement among learning-disabled students involved in Teacher-Directed Instruction (TDI) and independent seatwork. Results found a stronger relationship between academic-type classroom behaviours and achievement during TDI. Different types of classroom behaviours related to achievement for each type of instruction.
Wilson and David (1994) evaluated the academic intrinsic motivation and attitudes toward schools and learning of learning disabled Students. Administration of two affective tests to 89 students with learning disabilities (LD) in grades 4-8 revealed that subjects perceived the school environment and academic tasks as two separate factors. Learning disabled students, compared to non-disabled students, exhibited more positive attitudes toward the school environment than for academic learning tasks. School attitudes improved as grade level increased.

Nelson (1994) try to find out whether the children classified as learning disabled understand the criterial dimensions of different types of uncontested and contested knowledge or not. Sixty elementary students with learning disabilities were interviewed about parallel domains of uncontested and contested knowledge on the topic of space, including question of morality and questions of empirical law. Students clearly distinguished between uncontested and contested knowledge, suggesting that they are capable of working with curricula containing complex and controversial intellectual and social knowledge.

Bramlett (1994) conducted a comparative study of non-referred, learning disabled, and mildly mentally retarded students using the Social Skills Rating System (SSRS). He compared 20 learning-disabled, 20 mildly mentally retarded, and 20 non-referred students with this rating system. The study found that students with disabilities scored significantly lower than non-
referred group on social skills and significantly higher in problem behaviours. SSRS was able to predict group membership broadly (handicapped versus non-handicapped) but specifically (learning disabled versus mentally retarded).

Sizemore (1994) in her study conducted a support programme for parents of learning students in rural elementary school. The programme was implemented on parents of 34 learning disabled students by creating a support network at a private rural elementary school. The programme focuses on providing essential information to parents and increasing their involvement within the school setting. The programme involved: (1) monthly meetings of parents; (2) creative projects involving parents and children working together; and (3) development of improved communication channels among students, parents, teachers, and the school. Success of the program was measured by comparisons before and after program implementation utilising a School Involvement Parent Questionnaire, school records, and a Background Assessment instrument. A 30 percent increase in average scores was measured on the Background Assessment. A 15 percent increase in positive responses on the parent involvement questionnaire indicated increased parental engagement in creative projects.

Eshel (1994) made an attempt to find out the effects of mainstreamed or self-contained classes for students with a mild learning disability. The study compared a total of 108 elementary or high school
students with mild learning disabilities placed in either self-contained or regular classes. The study found no evidence that student growth was greater in the self-contained class, although these students tend to have a higher academic self-concept.

Susla (1994) conducted a social/emotional awareness program for learning disabled students. The social and emotional development needs of fourth and fifth grade students (N=16) with learning disabilities were addressed through development and implementation of a 12-week awareness program called “Pupils’ Over-Whelming Esteem Rise” (Project POWER). This project targeted: (1) self-awareness; (2) social awareness; (3) coping, organizing, problem solving, and planning; and (4) evaluation, through author-made games, activity sheets, creative projects, and use of technology. At program completion, most students demonstrated awareness of their specific learning style strengths and weaknesses and were able to use this knowledge when interacting with peers and teachers. A student-generated computer presentation showing their understanding of learning styles had a positive effect on student self-esteem. Increase in social skills and self-esteem were documented by pre/post-test differences.

Olenchak (1995) in his study on effects of enrichment on gifted/learning-disabled students examined the effects of a highly structured, personally tailored enrichment program for 108 students in grades 4 through 6 who were gifted and learning disabled. Results indicate that year-long
participation in the program had significant positive impact on attitudes toward school, self-concept, and creative production.

Quist (1995) in her study on the effect of using graphic organizers with learning disabled students to increase comprehension examined if there would be any significant difference in comprehension test scores when learning disabled students were instructed with and without graphic organizers while reading novels. Subjects were five male fifth-grade learning disabled students reading on the fourth-grade level, who came from the same middle-class suburban school and background. Students read two teacher-selected novels—the first novel was read without the use of graphic organizers, and the second novel was taught using graphic organizers. Subjects were asked a set of teacher generated comprehensions questions. Results indicated that the use of graphic organizers increased comprehension when used with learning disabled students.

Heberling and Shaffer (1995) in their study examined the effects of school attendance on the grade point averages (GPAs) of 70 regular education and 17 learning disabled fifth-graders in a rural school district. It found that school attendance had a significant positive influence on the regular education and learning disabled students' GPA's indicating that absenteeism directly affects the amount of learning at the elementary school level. The study also found that specific learning disabled students' GPAs were significantly lower than the GPAs of regular education students. No
significant difference was found in the rate of absence between specific learning disabled students and regular education students.

Simmons (1995) in his study examined the effects of explicit teaching and peer tutoring on reading achievement of learning-disabled students and non-disabled, low-performing readers in academically integrated classrooms. The study found that explicit-teaching students did not achieve reliably better than controls; students in the explicit teaching plus peer tutoring condition scored higher on reading fluency and comprehension than did explicit teaching or control students.

James and Milligan (1995) attempted to find out the effect of holistic instruction with two severely learning disabled students. For an entire school year, two low-achieving severely learning disabled third-grade students ("Billy" and "Bonny") spent 30 minutes each day working with a resource room teacher on a variety of holistic activities. Activities were added, discarded, or modified to maximise the children's motivation and success. "Cut-up sentences" were used early in the school year. The children enjoyed this activity because they dictated whatever they wanted to say and the teacher did the actual writing. Language experiences stories was another activity that both children enjoyed. Predictable books were read every day. Using a variety of popular magazines, the children "wrote" environmental print books. The dialogue journal activity occurred in the children's regular third-grade classroom. Billy started off drawing in his journal, but by January he was
writing stories with titles and illustrations. “Bonny's journal remained messy and disorganized throughout the school year. By the end of the year, Bonny's journal entries consistently expressed complete thoughts. During third grade, Billy seemed to become more confident in situations he expected to succeed. Bonny progressed from scribbling and doodling to writing sentences, stories, and notes in collaboration and with many one-to-one demonstrations. Holistic instructional activities used with these learning disabled students resulted in more complex, competent language use. Bonny and Billy demonstrate the power of authentic activities which require language use to achieve personal goals.

Mathew (2000) in her study on the effectiveness of self-instructional materials and modern instructional strategies in minimising learning disabilities of students in secondary schools found that the self-instructional materials focused on programmed learning and supervised learning module and the modern instructional strategy of guided inductive inquiry model are better than the traditional lecture demonstration method in the achievement of biology by the LD and ND students. The study also highlights the remarkable superiority of self-instructional materials and the modern instructional strategy in the achievement of the different objectives namely knowledge, understanding, application and skill. The study also found that extraneous variables like achievement motivation, home learning facility, study habits and socio-economic status had no significant relationship with
the achievement of the experimental and control groups of LD and ND students.

Garderen and Montague (2002) investigated students' use of visual imagery while solving mathematical problems. Students with learning disabilities (LD), average achievers, and gifted students in sixth grade (N = 66) participated in this study. Students were assessed on measures of mathematical problem solving and visual-spatial representation. Visual-spatial representations were coded as either primarily schematic representations that encode the spatial relations described in the problem or primarily pictorial representations that encode persons, places, or things described in the problem. Results indicated that gifted students used significantly more visual-spatial representations than the other two groups. Students with LD used significantly more pictorial representations than their peers. Successful mathematical problem solving was positively correlated with use of schematic representations; conversely, negatively correlated with use of pictorial representations.

Sturm, Joan and Erickson (2002) made a study on the effects of hand-drawn and computer-generated concept mapping on the expository writing of middle school students with learning disabilities. The purpose of this study was to examine the effects of two forms of concept mapping, hand-drawn and computer-generated, on the descriptive essay writing of middle-level students with learning disabilities. Twelve eighth grade students composed descriptive essays under three conditions; no-map support, hand-
map support, and computer-map support. The essays were compared on four measures: number of words, syntactic maturity, number of T-units, and holistic writing scores. Writing attitude was also examined. Results showed that student descriptive essays produced in the hand- and computer-mapping conditions demonstrated significant increases above baseline writing samples on number of words, number of T-units, and holistic writing scores. Carry over effects were observed in the no-mapping condition and provide an indication that students may have acquired writing skills that generalised into their essay writing when not using maps. Results showed that students' attitudes toward writing were significantly more positive in the computer-mapping condition when compared to no-mapping and hand-mapping conditions.

Cass et al. (2003) investigated the effects of manipulative instruction on the solving of area and perimeter problems by students with learning disabilities. A multiple baseline design was employed to test the effect of manipulative instruction on the perimeter and area problem-solving performance of middle and high school students who had been diagnosed with LD in the area of mathematics. Modelling, prompting/guided practice, and independent practice in conjunction with manipulative training were employed to teach both perimeter and area problem-solving skills. Analysis of data revealed that the students rapidly acquired the problem-solving-skills, maintained these skills over a 2-month period, and transferred these skills to a paper and pencil problem-solving format.
Wiener and Tardif (2004) analysed the effect of special education placement in the social and emotional functioning of children with learning disabilities. Children with learning disabilities in four types of special education settings were compared in terms of social acceptance, number of friends, quality of relationship with best friends, self-concept, loneliness, depression, social skills, and problem behaviours. Two of the placements (in-class support and resource room) were for children with mild to moderate learning disabilities and involved between 30 and 90 minutes of special education per school day. The other two placements (inclusion class and self-contained special education class) were designated for children with severe learning disabilities and involved at least half a day of special education. Children in the more inclusive placements had more positive social and emotional functioning. Children receiving in-class support were more accepted by peers, had higher self-perceptions of mathematics competence, and fewer problem behaviours than children receiving resource room support. Children in inclusion classes had more satisfying relationships with their best school friends, were less lonely, and had fewer problem behaviours than children in self-contained special education classes.
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