CHAPTER 3

REVIEW OF RELATED STUDIES

3.1 EDUCATIONAL DIAGNOSIS

3.2 REMEDIAL INSTRUCTIONAL PROGRAMMES
REVIEW OF RELATED STUDIES

The review of related studies is an essential part of any investigation. The survey of the related studies is a crucial aspect of the planning of the study. In the words of Turney and Robb (1971) the identification of a problem, the development of a research design and determination of the size and scope of the care and intensity with which a researcher has examined the literature related to the intended research.

The advantages the related studies is to provide insight into the statistical methods through which validity of the results is to be established. According to David (1969), The literature is review to create the content from the past for the new study to be conducted with new subjects and newly obtained data.

The analysis of related studies revealed that very few studies were conducted in the area of Remedial Teaching in Chemistry. The studies available in the related area are summarized and presented under the following heads:

(1) Educational Diagnosis

(2) Remedial Instructional Programmes
3.1 EDUCATIONAL DIAGNOSIS

Sankara\(^3\) (1957) studied the difficulties experienced by pupils of Standard IX in factorization. The study revealed that a great majority of the pupils experienced difficulties in dealing with negative numbers, applying rules of signs, factorization of polynomials and in recognizing common factor.

Chaudhary\(^4\) (1958) investigated into the difficulties of class X pupils of Delhi High Schools and Higher Secondary Schools in solving Geometrical exercises and identified the following difficulties: lack of understanding and interpreting Geometrical exercises; reasoning and interpreting the Geometrical figures.

Singh and Srivastava\(^5\) (1960) conducted a diagnostic study of common errors committed by students of Standard VIII in written English, their prevention and cure. The study revealed that lack of remedial and preventive techniques in English is one of the major reasons for committing errors in English.

Kumari\(^6\) (1964) studied the difficulties experienced by the pupils of standard VII in fundamental operations with decimals. The study revealed that many of the common types of errors committed by students were either due to lack of mastery of concepts or due to insufficient practice in operation with decimals.
Jacob (1965) studied the errors committed by the students of standard VIII in addition and subtraction in Algebra. The study revealed that majority of students under study had difficulty with terms having powers and was not able to distinguish between like terms and unlike terms and showed difficulty to follow the symbolic representation of Algebra.

Elias (1966) conducted a study to identify the common errors committed by the pupils of standard VI in fractions using a diagnostic test. The major findings revealed that a great majority of students experienced difficulty in division of fractions, especially with mixed fractions and multiplication and division.

Indapurkar (1968) conducted a diagnostic study of errors in learning English of Middle school Pupils of Chandrapur district. The study revealed that verbal inflection errors were frequent in Standards VI, VII and VIII.

Lype (1969) constructed a diagnostic test in Square root for pupils of Standard IX. The difficulties experienced by the pupils in different operations were the following: fundamental operations especially in multiplication and division and units of measurements.
Luke\textsuperscript{11} (1970) studied the difficulties faced by X\textsuperscript{th} Standard students of Kollam District in learning English Grammar. A diagnostic test was administered to 600 pupils of Standard X. The study revealed that the majority of the students under study had difficulties with English Grammar.

Ammal\textsuperscript{12} (1972) analysed the linguistic difficulties in learning Hindi, on a sample of 600 Secondary School pupils in Kerala. Linguistic analysis through a specially designed test revealed the relative difficulty among 27 different linguistic areas. The study revealed that the method of teaching Hindi language was inadequate and uninteresting. It also revealed that the majority of the school children exhibited deficiencies in learning Hindi language.

Jaleel\textsuperscript{13} (1975) conducted an experimental study to test the effectiveness of diagnostic approach in teaching Mathematics in Standard VIII. The study conducted on a sample of 440 students revealed that diagnostic approach in teaching Mathematics was effective for the total sample and sub samples.

Goraya\textsuperscript{14} (1979) conducted a diagnostic study in Mathematics at Primary level. The study revealed that most of the errors committed by students reflect the poor formation of decimal
concepts due to inadequate background. The study also revealed that \textit{carrying} in addition and \textit{borrowing} in subtraction were considered difficult due to the presence of decimal points.

\textbf{Nair}^{15} (1980) conducted a diagnostic study of the difficulties of university entrants in the use of chemical equations. The necessary data were collected by administering a diagnostic test in chemical symbols, formulae and equations. The study revealed that the nature and extent of errors committed by the students in the learning of chemical symbols, formulae and equations is influenced by certain selected socio-personal factors.

\textbf{Kumary}^{15} (1983) conducted a study on the procedures adopted and the difficulties experienced by pupils of standard VI\textsuperscript{th} Standard in solving verbal problems in Arithmetic. The study revealed that the pupils experienced difficulty in understanding the verbal problems; meanings of items in the problem and solving problems having more than one part.

\textbf{Saly}^{17} (1984) studied the difficulties experienced by pupils in the learning of Arabic in the secondary schools of Kerala. The areas of difficulty identified were: different types of word order; paraphrasing preposition, adjective and verbs and reconstruction of sentences.
Mathew (1985) identified the difficulties in learning chemistry experienced by educationally backward students at pre-degree level. The results of the study revealed that the Pre-degree students experienced a high level of difficulty in learning Chemistry and this is acute in the case of educationally backward students.

Sebastian (1985) studied the difficulties experienced by educationally backward students at Pre-degree level in learning Botany. The major causes identified were lack of pre-requisite knowledge, knowledge in related subjects, ability in concept attainment and comprehending abstract knowledge. The study revealed that the low achievers have more learning difficulty than high achievers.

Uzhuvathu (1985) studied the difficulties experienced by educationally backward students at Pre-degree level in learning Physics. The study revealed that pupils experienced great difficulty in learning Physics at first year Pre-degree level and this was acute in the case of educationally backward students.

Mohammed(1986) conducted a study to identify the errors committed by the Pre-degree students in writing English and found that the majority of the students committed errors in
tenses, preposition, noun and relative clauses, passive voice and auxiliary verbs.

Haslam and Tregust\textsuperscript{22} (1987) constructed a two-tier multiple choice instrument for the secondary school students. The result of the study revealed that a high percentage of secondary students do not comprehend the nature and function of respiration and have little understanding of the relationship between photosynthesis and respiration in plants.

Scott\textsuperscript{23} (1988) studied the effectiveness of a Computerised Diagnostic Inventory on Basic Mathematical skills. A Computerised Diagnostic Mathematics Instrument (CDMI/MS) was designed parallel to the commercial paper and pencil inventory published by McGraw Hill. Analysis of the findings revealed that the CDMI/MS requires significantly less time and fewer questions than that of the paper and pencil inventory.

Tregust\textsuperscript{24} (1988) developed Diagnostic tests in Chemistry and Biology to evaluate students' misconceptions and errors committed in Science. Analysis of the results of the tests revealed that Diagnostic tests were very much effective for identification of errors and misconceptions of both teachers and students in Chemistry and Biology.
Peterson et al.\textsuperscript{25} (1989) studied the misunderstandings of grade – 11 and grade – 12 students in Chemistry (co-valent bonding and structure) using a Diagnostic instrument. The results of the study indicated that the two-tier Diagnostic instrument provided a feasible approach for evaluating students' understanding and for identifying misconceptions and misunderstanding in the Chemistry.

Jose\textsuperscript{26} (1990) studied the difficulties experienced by Vocational Higher Secondary students of Kerala in learning Botany. The study revealed that VHSE students experienced difficulty in the skill of hierarchical learning and in attaining concepts of Botany.

Varghese\textsuperscript{27} (1991) studied the difficulty in learning fractions by pupils of standard VI. The study revealed that the following areas are difficult for the majority of students due to the lack of understanding of fundamental concepts: changing the whole number into a fraction; changing an improper fraction into a mixed fraction and addition and subtraction of improper and mixed fraction.

Banarjee\textsuperscript{28} (1993) assessed the students' and teachers' understanding of Chemical Equilibrium. A Diagnostic test on
Chemical Equilibrium was administered to collect necessary data. The study revealed that both teachers and students committed errors in the following concepts in Chemistry: Le Chatlier's Principle, Rate and Equilibrium, Applications of Equilibrium to acids, base and ionic solutions.

**Jasmine** (1994), studied the difficulties experienced by the pupils of standard III in computation, by a Diagnostic test. The study revealed that the level of attainment of students was very poor for the division of four digit numbers with one digit number.

**Jayalekshmi** (1994) studied the difficulties in computations experienced by the students in standard IV. The study revealed that out of the fifty teaching points studied, the level of attainment is very good in the case of six teaching points, good in the case of twenty three teaching points, satisfactory in the case of fifteen teaching points, poor in the case of five teaching points and very poor in the case of only one teaching point due to the lack of understanding the basic concepts of computation.

**Unisa** (1994) identified the difficulties experienced by lower primary school children in learning Science. The study was intended to prepare a diagnostic test in LPS Science so as to
identify the difficult areas of knowledge, understanding, application and to arrange the various categories of difficult areas on the decreasing order of difficulty. The study revealed that the most difficult area in the cited categories is application.

Rani\textsuperscript{32} (1996) investigated the causes of difficulties experienced in teaching English poetry at the Secondary level. The study revealed that the difficulties experienced by pupils were due to the inadequate library facilities, illiterate parents, and uninteresting themes of poems and ineffective method of teaching.

Sindhu\textsuperscript{33} (1996) studied the difficulties experienced by the fifth standard pupils in learning fractions. The study revealed that many of the common errors made by pupils were due to lack of understanding of principles involved in the addition, subtraction and multiplication with fraction and inadequate practice in doing problems in fraction.

Jayasree\textsuperscript{34} (1997) identified the difficulties experienced by the pupils of standard VIII in expanding algebraic expression using identities with the help of a diagnostic test. The study revealed that the level of attainment is poor in the case of classification of open and closed sentences, finding the always true sentences and product numbers using identities. The study also revealed that
there is no mastery of the rules of signs and many pupils do not seem to have a clear grasp of the identities.

Beebar³⁵ (1998) analysed the difficulties experienced in learning Science as revealed through their understanding of gas exchange in plants. The study revealed that during the interviews, the students in the group below median were often able to recall facts and apply knowledge, but they had failed to recall and apply the knowledge while responding to the written questions.

Duchovic³⁶ (1998) in his diagnostic study discussed two techniques, which have been utilized for five semesters in general chemistry courses. The techniques used were repackage system and writing exercises based on the laboratory portion of the course. Both the techniques were found to be equally effective for learning Chemistry at undergraduate level without any misconception and difficulties.

Dhanya³⁷ (1999) conducted a Diagnostic study to identify the difficulties experienced in learning Algebra at the Secondary Level. The study revealed that the majority of the students faced difficulties in the case of items having more than one variable. Majority of the students had not understood the meaning of like terms and errors in concepts of like and unlike terms.
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Suhrn\textsuperscript{38} (1999) analysed the factors affecting reading difficulties of the students of college of Micronesia. The study revealed that the factor contributed to the problems fall in the following areas: language, educational background, culture, motivation, learning and reading strategies of the students and the teaching methodologies, institutional policies and sociopolitical conditions of the school.

Vasudevan\textsuperscript{39} (2003) conducted a Diagnostic Study to identify the difficulties experienced by pupils studying in Standard VIII, in the \textit{computation of negative numbers}. The study revealed that majority of the students faced difficulty in carrying out the fundamental operations involving negative numbers due to the lack of clarity on rules of fundamental operations.

3.2 STUDIES RELATED TO REMEDIAL INSTRUCTIONAL PROGRAMMES

Rodgers\textsuperscript{40} (1932) studied the grammatical errors committed in free composition by Junior High School pupils. It listed some of the typical errors made by pupils and provided guidelines for developing remedial instructional programmes.
Stuart\textsuperscript{41} (1940) studied how innovative techniques can be used to make remedial teaching classes interesting and novel. The study revealed that the use of daily newspapers and magazines can be used as effective practice material in remedial classes.

Guiler\textsuperscript{42} (1946) identified the difficulties faced by new students in colleges in the use of sentence structure. The study revealed that the remedial instruction is effective in learning sentence structure.

Habel\textsuperscript{43} (1950) studied the errors committed by newcomers to colleges in Arithmetic application and provided remedial teaching to overcome the errors.

Thiruvenkatachary\textsuperscript{44} (1967) conducted a remedial teaching programme to measure the pupils' ability to write with speed without loss of legibility and accuracy. The study revealed that speed in writing could be enhanced to about forty six letters per minute after providing remedial teaching.

Sie\textsuperscript{45} (1969), constructed a diagnostic test in basic skills in Arithmetic computation for pupils of standards V, VI and VII and to provide remedial measures. When the mistakes were diagnosed
and provided remedial teaching, the students progressed well in Mathematics.

Oad 46 (1980) conducted a Diagnostic study of language errors and developed a programme for remedial teaching in Hindi at school level. The study revealed that the number of errors decreased from class VI to VIII and increased in classes IX and X. The study also revealed that the errors can be rectified by effective remedial teaching programmes.

Vijayakumar 47 (1982) conducted a study on a Diagnostic Remedial Approach to some select portions in BSc Chemistry. The main objectives of the study were: to analyse the nature and frequencies of errors committed by students in select concepts in Organic Chemistry and to analyse the different types of difficulties existed in the development of the select components. The study revealed that the errors were very high even in the very simple aspects of chemical terminology, formulae, structure and information associated with chemical symbolism.

Jain 48 (1984) conducted a diagnostic study of language errors in Sanskrit. The study was intended to identify the types of errors in Sanskrit, the causes, and to prepare a programme of remedial teaching. The study revealed that Remedial programme was effective in reducing the errors in Sanskrit.
Joshy (1985) conducted a study to classify errors with their sub-types and to develop the remedial programme. The study revealed that the number and quality of errors were reduced after the introduction of the remedial programme which included correction of spelling, written expressions and drilling.

Desai (1986) developed a remedial programme for improving the language ability of children in standard IV. The major finding of the study was that most of the defects committed the first three years of the primary school consisted of errors on spelling, missing letters and faulty pronunciation, which can be minimized by Remedial Instruction.

Verma (1986) constructed a diagnostic test in Chemistry and identified the reasons for committing errors in Chemistry. The investigator prepared remedial materials on selected topics and tested the effectiveness of remedial materials prepared.

Rogan (1988) conducted a study on concept mapping as a diagnostic aid. Concept maps were prepared and tested the effectiveness as diagnostic aid. The study revealed that concept mapping is appropriate for remedial teaching in any area of study.

Malaiikkani (1992) developed a remedial package for the teaching of English consonants at Higher Secondary level. He
studied the effectiveness of remedial teaching package over traditional methods. It was found that English consonants using the remedial package was more effective than traditional method of teaching.

Vasanthi\(^5^4\) (1994) developed a remedial programme in Mathematics for IX\(^{th}\) standard students. The study revealed that teaching through the remedial programme was found to be effective over the traditional Lecture method.

Reddy and Janak Kumar\(^5^5\) (1997) developed a remedial package for learning the spoken skill in English in Standard IX and measured the effectiveness of remedial package with special reference to low achievers. The results obtained showed that the instruction through remedial package was more effective than traditional Lecture method in teaching spoken skills in English and it enabled the low achievers to cope with the normal students to a significant extent.

Anjaneyalu et.al\(^5^6\) (1998) conducted a study on the usability of a Remedial Multimedia tutorial, uses Netscape in the context of a Remedial Teaching system in Biology. The student is given fine grained diagnostic tests based on concepts on the human brain. Depending on the performance in these tests the student is allowed to browse through relevant material using Netscape
Burke et al.\(^5\) (1998) designed conceptual computer animations for Remedial teaching to help students understand the basic concepts and principles of a dynamic chemical process. They argued that an animation sequence should be linked to a lecture demonstration, thereby assisting in the presentation of all three levels of representation: microscopic, macroscopic and symbolic.

Francisco et al.\(^5\) (1998), in their diagnostic study incorporated three teaching strategies such as discussions, concept maps and co-operative learning to a fresh man Chemistry course, instead of usual lecture format. The study revealed that integration of the teaching strategies will be more beneficial for overcoming difficulties in Chemistry.

Pinto\(^5\) (1998) conducted a study for finding out the effective use of sports for teaching the difficult concepts in Chemistry like chemical bonding and atomic structure.

Moses\(^6\) (1998) Conducted a study on the Structural Drill in Remedial Teaching. The study identified that the most frequently occurring grammatical error in the written work of students is the error concerned with subject-verb agreement. The study concluded that structural drills have an important role in Remedial
Teaching and the structural drill must be suitably modified to individual learner's needs and specific Pedagogic contexts.

Newman\textsuperscript{61} (1998) conducted a study on diagnosing Math learning disabilities and recommended practices to overcome the disabilities identified. The study is concerned with the diagnosis and remediation of the difficulties Primary School children experiences in Mathematics. The study revealed that outside of reading difficulties, problems in Mathematics represent the greatest single source of learning difficulty experienced by Primary School children.

Tharakan\textsuperscript{62} (1998) conducted a study on diagnosis and remediation of certain common Grammatical errors committedly Secondary School students in Written English. The major tools and techniques used were teacher made diagnostic test. Teacher made Pre-requisite test and Achievement test. The study revealed that the number of errors committed by the pupils in Written English can be reduced though Remedial practice with in the limited time.

Granath and Russel\textsuperscript{63} (1999) developed a card game for remedial teaching of nomenclature of the elements and their symbols in the first laboratory session of General Chemistry.
The game helped the students to learn and review the symbols of the elements without much error.

Castro-Acuna et al. (1999) developed logic puzzles as a remedial programme to solve the problems in chemistry easily and without many errors. These logic puzzles were field-tested with a diverse audience in the general Chemistry classes at the University of Nebraska-Lincoln and were found to be effective for remedial teaching.

Wickenden (1999) conducted a study based on the developmental speech, language and communication difficulties. The main objective of the study was to develop understanding of the range, nature and causes of developmental speech, language and communication difficulties and to develop suitable remedial programmes to overcome the difficulties identified.

Crute (2000) described a modification of a BINGO game to chemical nomenclature and specific application to alkenes. The use of games in the Chemistry classroom can provide instruction, feedback, practice, fun and avoidance of misconception and remediation.

Joy (2002) conducted a study on diagnosis of errors and development of remedial materials for teaching Chemistry at
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Vocational Higher Secondary Level. The Investigator administered a two-tier Diagnostic test and developed remedial teaching materials on selected difficult topics based on the Diagnostic test. Effectiveness of remedial teaching materials was tested by Experimental cum Survey method. The study revealed that Remedial teaching was superior to Lecture method in immediate post-test and delayed memory achievement in Chemistry.

Geetha\(^68\) (2002) conducted a study to test the effectiveness of remedial programmes to improve the word-recognition skill and reading comprehension skills of low achievers. The effectiveness of the remedial programme was studied by Survey-cum-Experimental method. The remedial programmes developed in the study were found to be more effective than conventional Lecture-Demonstration methods.

Raizada\(^69\) (2002) conducted a study on Evaluation and Remedial Teaching in Commerce subjects at the Plus Two level. In the course of study, the Remedial steps adopted were personal attention, tutorial classes, re-teaching the micro concept and changing the method of teaching.
DISCUSSION

Remedial Teaching can be considered as an effective correction technique, a programme to improve teaching-learning process, an instruction for overcoming difficulties and misconceptions in various subjects. The studies revealed that Remedial Instructional Materials were effective in improving academic attainment of students.

Analysis of the related studies helped the investigator in the preparation of Diagnostic test, Remedial teaching materials and in selecting suitable experimental procedures.

The Analysis of studies related to Diagnostic Testing and Remedial Teaching, revealed that Diagnostic Testing in teaching can be used, as a technique for finding out the frequency and types of errors committed by students, for the correction and elimination of individual weaknesses, as a tool for finding out the reason for committing errors, as a technique for prognosis and in guidance and counseling in academic dimension. It can also be used as a prevention technique for common errors and in identifying major hindrances in learning various concepts.
REFERENCES


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(21) T.K. Mohammed (1986). *A Diagnostic study of errors in the written English of Pre-degree students*. In M.B. Buch (ed), Fourth survey of research in Education, 1983-1988, New Delhi: NCERT.


Review of Related Studies


Review of Related Studies


(45) Sae. (1969). *A Diagnostic test in the skills of using Geometrical instruments (standardVI and VII) in Gujarathi*. Cited in M. B. Buch (Ed), First survey of research in Education.


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