CHAPTER SECOND
REVIEW OF RELATED LITERATURE AND RESEARCHES

2.0 INTRODUCTION:

In the previous chapter the researcher has introduced the historical review of Mathematics and teaching methods. The researcher discussed the importance, aims, innovative practices of Mathematics teaching and the various methods of Mathematics teaching. The researcher further explained the statement of the problem, objectives of the study, hypotheses of the study, significance of the study, scope and limitations. Lastly the researcher gave the information about the chapterisation.

In this chapter the researcher has taken a brief survey of related literature and research work regarding teaching of Mathematics done in India and abroad.

2.1 IMPORTANCE OF RELATED STUDIES:

The survey of previous studies, literature related to the problem may accomplish a number of purposes. In the words of Best J.W. (2011), “A summary of the writings of recognized authorizes and of previous research provides evidence that the research is familiar with what is already known and what is still unknown and untested. Since effective research is based upon past knowledge, this step helps to eliminate the duplication of what has been done and provides useful hypothesis and helpful suggestions for significant investigation.”

In searching related studies the researcher noted certain important elements as -

1. Report of studies of closely related problems that has been investigated.
2. Main objectives of the study.
3. Design of the study.
4. Major findings of the study.

According to Good, Barr and Scotters (1935) survey of related researches & literature serves the following purposes.

1. To show whether the evidence already available, solves the problem.
2. To provide ideas, explanation in hoo d to the problem.

3. To locate corporate data useful in the interpretation of result.

4. To contribute to the general scholarship of investigation.

Hence the review of related literature is one of the first steps in the research process. It helps the researcher to define the problem, recognizing its significance and selecting appropriate sources of data. The researcher takes many hints from the designs and procedure of previous research to reach conclusions in the studies of similar types. It also provides the research possibilities that have been overlooked so far i.e. it helps in planning and execution of research work.

2.2 OBJECTIVES OF REVIEW OF RELATED STUDIES:

The main purpose of a review of related studies is to analyze scientific works by other researchers that researcher used for investigation critically. The following are some of the objectives of such a survey.

1. To show whether the evidence already available, solves the problem.

2. To provide ideas, explanation in formulating the problems.

3. To suggest appropriate research method to the problem.

4. To locate corporate data useful in the interpretation of result.

5. To contribute to the general scholarship of investigation

For the purpose of reviewing the related research study, the researcher referred the following.

1. Review collected by internet

2. Books

3. Review taken from different manuals

Thus different literature and researches have been divided into two groups, as follows-

A. Review of related literature

B. Review of related research

Review of related literature is further divided into two groups, as -

1. Related literature in India
2. Related literature in abroad

Review of related researches is further divided into two categories, as -

a. Related to instructional package on Mathematics
b. Related to development and use of self instructional material.

2.3 REVIEW OF WORK DONE:

Researcher reviewed different literature and researches. Review of work done are divided into two categories.

A. Review of related literature
B. Review of related researches

The diagrammatic presentation of review of related studies is shown as bellow.

Fig. 2.1
Diagrammatic presentation of review of related studies

2.3.1 REVIEW OF THE RELATED LITERATURE:

According to Walter R. Borg, “The review of literature in any field forms the foundation upon which all further work will be built.” Thus if one fails to the review of the literature, his work is likely to be shallow and naïve and will often duplicate with work that has already been done better by someone else. In view of the facts
Carter V. Good (1973) observes, “In order to be truly creative and original, one must read extensively, critically as a stimulus to think.”

Researcher reviewed different related literature. Review of related literature is divided into two categories.

A. Review of related literature from India

B. Review of related literature from abroad

2.3.1.1 REVIEW OF RELATED LITERATURE FROM INDIA:

The researcher read different periodicals, magazines, local internet sites and books for research purpose.

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<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Writer</th>
<th>Year</th>
<th>Title</th>
<th>Resource</th>
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<tr>
<td>1</td>
<td>NCERT</td>
<td>Dec., 2005</td>
<td>National Curriculum Framework 2005</td>
<td>NCERT</td>
</tr>
<tr>
<td>2</td>
<td>Donnipad Manjunath</td>
<td>May, 2010</td>
<td>Mathematics Laboratory – an Alternative Method of Instruction</td>
<td>Internet site Article</td>
</tr>
</tbody>
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Fig.2.2

Review of Related Literature from India

1. **National Curriculum Framework (2005)** recommends that the teaching of mathematics should enhance the child’s resources to think and reason, to visualise and handle abstractions, to formulate and solve problems. This broad spectrum of aims can be covered by teaching relevant and important mathematics embedded in the child’s experience. Succeeding in mathematics should be seen as the right of every child. For this, widening its scope and relating it to other subjects is essential. The
infrastructural challenge involved in making available computer hardware, and software and connectivity to every school should be pursued.

**Vision for School Mathematics**

1. Children learn to enjoy mathematics rather than fear it.
2. Children learn important mathematics: Mathematics is more than formulas and mechanical procedures.
3. Children see mathematics as something to talk about, to communicate through, to discuss among them, to work together on.
5. Children use abstractions to perceive relation-ships, to see structures, to reason out things, to argue the truth or falsity of statements.
6. Children understand the basic structure of Mathematics: Arithmetic, algebra, geometry and trigonometry, the basic content areas of school Mathematics, all offer a methodology for abstraction, structuration and generalisation.
7. Teachers engage every child in class with the conviction that everyone can learn mathematics.

School Mathematics can play a significant role in developing such useful skills. Visualisation and representations are skills that Mathematics can help to develop. Modeling situations using quantities, shapes and forms are the best use of mathematics. Mathematical concepts can be represented visualising proof in multiple ways, and these representations can serve a variety of purposes in different contexts. All of this adds to the power of Mathematics. For example, a function may be represented in algebraic form or in the form of a graph. The representation p/q can be used to denote a fraction as a part of the whole, but can also denote the quotient of two numbers, p and q. learning this about fractions is as important, if not more, than learning the arithmetic of fractions. There is also a need to make connections between Mathematics and other subjects of study. When children learn to draw graphs, they should also be encouraged to think of functional relationships in the sciences, including geology. Our children need to appreciate the fact that Mathematics is an effective instrument in the study of science.
The importance of systematic reasoning in Mathematics cannot be over emphasised, and is intimately tied to notions of aesthetics and elegance so dear to mathematicians. Proof is important, but in addition to deductive proof, children should also learn when pictures and constructions provide proof. Proof is a process that convinces a doubtful adversary; school mathematics should encourage proof as a systematic way of argumentation.

As children grow older, they should be taught to appreciate the significance of such conventions and their use. For instance, this means that setting up of equations should get as much coverage as solving them. In discussing many of these skills and processes, we have referred to a multiplicity of approaches and procedures. These are all critical for liberating school Mathematics from the cruelty of applying them only to those algorithms that are taught.

2. Donnipad Manjunath(2010) expressed that the, according to National Education Policy 1986, Mathematics should be visualised as the vehicle to train a child to think, reason, analyze and articulate logically. Apart from being a specific subject, it should be treated as an allied to any subject involving analysis and reasoning.

With the introduction of computers in schools, educational computing and emergence of learning through understanding of cause-effect relationships and the interplay of variables, the teaching of Mathematics will be suitably redesigned to bring it in line with modern technological devices so that learning takes place effectively.

It was also observed that students who frequently try to solve exercises related to new mathematics topics by finding the inter-connections and who discuss practical problems related to everyday life tend to score good in mathematics examinations. Teachers, who use of active learning strategies like students working on mathematics projects, connecting mathematical knowledge to everyday life when solving mathematics problems and actively participating in peer-group interaction have always significantly contributed to good performance in mathematics.
So, a strategy for teaching mathematics in a different but suitable atmosphere that would transform the position of the teacher to facilitator of learning from an authoritarian and

The study established that; traditional didactic methods of teaching do not facilitate learning by understanding nor providing opportunities to students to relate their knowledge with real life, besides making low performers in the subject of mathematics. It was further established that, use of strategy evolved integrating three different methods for teaching mathematics in a Lab atmosphere yielded improved performance of students.

So, the study found a positive and significant correlation between the academic achievement of secondary school students and the use of different methods of teaching in a Laboratory atmosphere. Hence, teachers teaching mathematics shall use Mathematics Laboratory as a platform and by using the strategy or any method other than didactic methods to make a significant impact in the knowledge construction so as to improve the performance of secondary school students.

3. Rachna Patel (2010) has discussed that the, Mathematics being so important subject and occupying a central position since the ancient period still, it has not been the interest of many students. The gaps are found between aspiration and achievement. Mathematics is highly abstract. It is concerned with ideas rather than objects; with the manipulation of symbols rather than the manipulation of object. It is a closely-knit structure in which ideas are interrelated. Mathematical concepts are hierarchical and interconnected, much like a house of cards. Unless lower-level concepts are mastered, higher-level concepts cannot be understood. Students, who discover some of the structures of mathematics, are often impressed by its beauty. They note the lack of contradiction, and they see how a new technique can be derived from one that has already been learned. Teaching of mathematics is not only concerned with the computational know how of the subject but is also concerned with the selection of the mathematical content and communication leading to its understanding and application. So while teaching mathematics one should use the teaching methods, strategies and pedagogic resources that are much more fruitful in gaining adequate responses from the students then we have ever had in the past. The teaching and learning of mathematics is a complex activity and many factors
determine the success of this activity. The nature and quality of instructional material, the presentation of content, the pedagogic skills of the teacher, the learning environment, the motivation of the students are all important and must be kept in view in any effort to ensure quality in teaching-learning of mathematics.

In this paper the presenter has made an effort to discuss innovations and innovative practices in teaching mathematics, under teaching methods, strategies and pedagogic resources. The process of innovation is generally described as consisting of three essential steps, starting with the conception of an idea, which is then proposed and is finally adopted. Though many ideas have been conceived to bring about change in the teaching of mathematics, it is yet to be proposed and adopted. So, the innovations discussed may not be new in terms of the idea but is new in terms of practice.

4. Nisha Raninga (2010) has focused on effectiveness of CAI for Teaching of Mathematics of Standard VII. The importance of using computers in a mathematics class may not be limited to the ability of computer assisted instruction (CAI) to improve learning; rather, computer use adds another dimension to the teacher’s repertoire of strategies, which may improve overall learning. To make the teaching of mathematics effective a number of teaching methods and technologies are being evolved, computer assisted instruction (CAI) is one of them. In present study an attempt has been made to compare effectiveness of CAI method and traditional method of teaching “Mean, Median and Mode” unit of mathematics of class VII standard. A total of 66 students from the VII class of a Gujarati medium higher secondary L.B.S school in Rajkot were chosen as a sample. Further they were divided into two equal competent groups’ i.e. experimental and controlled group on the basis of performance in the score of mathematics test. After every experiment, achievement-test was administered and the results were evaluated and analyzed by considering appropriate statistical measures like mean, standard deviation (SD) and t-value. The analysis reveals that the t-value was significant in case of experimental group. So, the researcher has rejected the null hypothesis and concluded that CAI method was effective for teaching mathematics to the VII standard students as
compared to the traditional method. This will beckon a step further towards quality secondary education.

2.3.1.2 REVIEW OF RELATED LITERATURE FROM ABROAD:

The researcher accessed search engines on the www, international publications, books and international research material to conduct his own research.

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<tr>
<th>Sr. No.</th>
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<th>Year</th>
<th>Title</th>
<th>Resource</th>
</tr>
</thead>
</table>

**Fig 2.3**

Review of Related Literature from Abroad

1. **Erika Gyongyosi(2002)** has given two massages

   1. School can use technology more effectively and for the welfare of students, teachers and society, they must do so.

   2. Initial teacher training is not enough, teachers need continuing training as the technology changes, as new and more effective application are developed.

   Preparing teachers to use computers is a process that is never completed. If computers are to be effective in schools, however, upending of some present practices
must occur, and frightens many people. Their anxiety is understandable but groundless. Although teachers will have to alter their accustomed practices, there will reach a new level of importance, will accomplish more, and will have greater job satisfaction when school take advantage of the power of computers.

In the first section problems posed by the introduction of computers and networks in schools will are studied. In the second section benefits and challenges of computer assisted education will be discussed. In the third section researcher will gave a description of a continuing teacher training programme.

2. M. K. Akinsola and F. B. Olowoaiye(2008) examined the effect of behavioral objective-based (BOBIS) and study question based (SQBIS) instructional strategies on students’ attitude towards Senior Secondary Mathematics. The three hypotheses for the study were tested and significant at 0.05 levels. The issue of attitudinal changes of student in mathematics classroom is an evergreen topic which cannot be wished away. It is therefore important to search for more and simple methods/ways by which teachers could continually inspire positive attitude in mathematics classroom. The research adopted a pre-test, post-test, control group quasi experimental design. There were three treatment groups which are - two experimental groups (behavioral objective-based (group1, N=117) and study question-based (group II, N=95) instructional strategies) and a control group (group III, N=100). A total of 312 students were involved in the study. The classrooms were randomly selected in each school and all the students in the selected classroom constitute the sample (intact class). Students’ Attitude Questionnaire (SAQ) has a reliability coefficient of r = 0.81. Findings revealed a significant effect of treatments (BOBIS and SQBIS) on students’ attitude towards Mathematics. The result was (F (2,311) = 72.95, P < 0.05). There was a significant difference in attitude between behavioral objective based instructional strategy group and the control group with the BOBIS group having far better attitude to mathematics than the control group. Similarly, significant difference was found between the attitude of SQBIS group and the control group but no significant difference in attitude was found between BOBIS group and SQBIS group. Behavioral objective-based and Study-question-based groups were found to have similar attitude towards. In other words, there was significant differences between the attitudes of subjects exposed to behavioral objectives and control group and between
those exposed to study question and the control group and no significant difference in attitude between the behavioral objective and study question groups. Both experimental groups (BOBIS and SQBIS) proved to be superior to the control group. Based on the findings, behavioral objective-based and study question-based instructional strategies were found to be viable instructional strategies that could promote positive attitude towards mathematics. The implication of the result is that teachers’ method of instruction in classroom is important in changing students’ attitude and habits towards mathematics.

3. **Ebele C. Okigbo and Abigail M. Osuafor (2008)** focused on the study investigated the effect of using mathematics laboratory in teaching on students’ achievement in Junior Secondary School Mathematics. A total of 100 Mathematics students were involved in the study. The study is a quasi-experimental research. Results were analyzed using mean, standard deviation and analysis of covariance (ANCOVA). From the findings, it was observed that the use of mathematics laboratory enhanced achievement in mathematics. The results also showed that no significant difference exists in the achievement of male and female mathematics students taught with mathematics laboratory. The study recommended that teachers should be encouraged to use mathematics laboratory in teaching plane geometry and algebraic expression and mathematics student teachers should be trained on its use in their methodology class.

4. **Adem Duru (2010)** has compared the experimental teaching method (ETM) with the teacher centered traditional teaching method based on students’ success. This study is conducted with 54 students, randomly divided into two groups; an experimental group and a control group. Experimental teaching method was used for the experiment group and traditional teaching method was used for control group. The test was applied to both groups in two different times. The first test was applied before and the second test was applied after the teaching. ‘t’ value was used to compare the two groups and the level of significance was measured as p<0.005. According to the research results, it was found that experimental teaching method was more effective than teacher-centered traditional teaching method in the knowledge and comprehension level.
2.3.1.3 CONCLUSIONS FROM REVIEW OF THE RELATED LITERATURE:

There are overall eight literature in this category, some are downloaded from the internet and some are selected from the publications.

1. School mathematics should encourage proof as a systematic way of argumentation.

2. Experimental teaching method was more effective than teacher-centered traditional teaching method in the knowledge and comprehension level.

3. Computer assisted instruction method was effective for teaching mathematics to the VII standard students.

4. Schools can use technology more effectively and teachers need continuous training as the technology changes.

5. Teachers’ method of instruction in classroom is important in changing students’ attitude and habits towards mathematics.

6. The use of mathematics laboratory enhanced achievement in mathematics.

2.3.2 REVIEW OF RELATED RESEARCHES:

Using the library and the websites, it had become easy to access the researchers conducted in India and abroad. Research information conducted by fellow researches was easy to digest so as to conduct as independent research. There are some directly and indirectly research available.

Reviews of related research are further divided into two categories cited as follows.

a. Related to instructional package on mathematics.

b. Related to development and use of self instructional material.
## 2.3.2.1 REVIEW OF WORK DONE RELATED TO INSTRUCTIONAL PACKAGE ON MATHEMATICS:

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Name of Researcher</th>
<th>Year</th>
<th>Level</th>
<th>Title</th>
<th>Sample</th>
<th>Source</th>
</tr>
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<tbody>
<tr>
<td>2</td>
<td>Chitkara M.</td>
<td>1985</td>
<td>Ph.D.</td>
<td>To Study the Effectiveness of Different Strategies of Teaching on Achievement in Mathematics in Relation to Intelligence, Sex and Personality</td>
<td>Secondary students</td>
<td>Pan. U</td>
</tr>
<tr>
<td>3</td>
<td>Patadia H.J.</td>
<td>1987</td>
<td>Ph.D.</td>
<td>A Strategy for Mastery Learning in Fifth-Grade Geometry</td>
<td>Secondary students</td>
<td>MSU</td>
</tr>
<tr>
<td>6</td>
<td>Suwana, R.</td>
<td>2004</td>
<td>Ph.D.</td>
<td>Effectiveness of Computer Assisted Instruction for Primary School Students: An Experimental study</td>
<td>Primary School Students</td>
<td>South Gujarat Uni. Surat</td>
</tr>
</tbody>
</table>

### Fig. 2.4

Review of Work Done Related to Instructional Package on Mathematics

1. **Bhalwankar, A.G., (1985)** conducted the Study of Effects of Expository and Guided Discovery Methods of Teaching Mathematics on the Achievements of Students of Different Levels of Intelligence. The population selected for testing was class IX pupils. From this population, three samples, namely, boys, girls and rural pupils, were selected. On each sample an intelligence test was administered. Each sample was then divided into two equivalent groups on the basis of their means and SDs on this intelligence test. Thus the two groups were matched for intelligence. After dividing each sample into two equivalent groups, one group was allotted to the guided discovery approach and the other was allotted to the expository approach.
Identical topics from arithmetic, algebra and geometry were taught to both the groups for one month. After this a test on these topics was administered to the two groups. The randomized blocks design was based upon the principle of grouping experimental units into blocks. Blocks were formed on the basis of intelligence which was related to achievement in mathematics.

The researcher found that there was no significant difference in achievement in mathematics when taught by the guided discovery and expository approaches. Intelligence had no change in achievement when taught by the guided discovery and expository approaches, except in the case of urban boys.

2. Chitkara, M., (1985) studied that the Effectiveness of Different Strategies of Teaching on Achievement in Mathematics in Relation to Intelligence, Sex and Personality.

The aims of this study was to investigate whether achievement in mathematics was affected by different strategies of teaching, whether different strategies had differential effects on achievement of male and female students and whether personality acted as a potential factor in selection of teaching strategy. In the study a pretest/post-test experimental design, was followed. A four-way factorial design (3 X 2 X 2 X 3) was employed. The independent variables in the study included strategies of teaching, sex, personality and intelligence and the criterion variable was achievement in mathematics. Toe strategies of teaching varied in three ways-(a) lecture-discussion, (b) inductive-drill and (c) auto- instruction group discussion. A sample of 300 students was randomly selected from grade IX students of four schools of Chandigarh. The data collected through pretest/post-test were analysed through four way (3 X 2 X 2 X 3) analysis of variance.

The researcher found that all the three strategies, namely, (a) lecture-discussion, (b) inductive-drill, and (c) auto- instruction group discussion, were found to be equally effective in terms of achievement in mathematics disregarding levels of intelligence, sex and personality type. and Boys and girls of superior ability did not show any significant difference between their mean scores on achievement in mathematics.
3. Patadia, H.J., (1987) developed the Strategy for Mastery Learning in Fifth-Grade Geometry. The major objective of the study was to develop a strategy for mastery learning in geometry for the pupils of the fifth grade, and to validate the effectiveness of the developed strategy.

The strategy was initially tried out on 110 pupils. The students were divided into two experimental and control group on the basis of their intelligence measured by the intelligence test. The pupils' achievement was measured through criterion achievement tests developed by the investigator. On the basis of the feedback received from the initial try-out, the strategy was modified. The strategy was finally tried out on 94 pupils of the Baroda High School, 51 in the experimental group and 43 in the control group. The pupils' achievement was measured through criterion tests, and reactions of students were obtained through a questionnaire. The data were analysed through statistical techniques such as percentiles, mean, standard deviation, coefficient of correlation and t-test.

The researcher found that the dependence of the achievement of pupils on their I.Q. could be reduced considerably by using the strategy for mastery learning developed by the investigator and the strategy was liked by the pupils and was feasible in the real classroom situation.

4. Rose, Antony Stella. V., (1992) in his study entitled ”The application of computer Assisted Instruction (CAI) and the Teacher support system (TSS) for the optimum development of underachievers.” The sample consisted of three groups of size 32 each composed of students of std IX selected from three Tamil Nadu State Board Schools covering one rural and two urban. Using the regression analysis identified the underachievers in the sample.

The researcher found that the both the CAI strategies were superior to the traditional method instruction, and CAI with Teacher Support System (TSS) was more effective than CAI without TSS for underachievers (UA)

5. Sindhi, N.O., (1996) studied the construction and try out of multimedia package for the teaching of physics in standard XI. The major objective of the study was to develop and study the effectiveness of multimedia package in Physics in terms of achievement.
The researcher found that the teaching through multimedia package is more effective in comparison to conventional method of instruction. and the students can remember it for a longer time.

6. Suwana, R., (2004) studied that the effectiveness of Computer Assisted Instruction for Primary School Students: An Experimental study. The major objective of the study was to know the effectiveness of Computer Assisted Instruction developed by ONPEC for primary school students to learn English and Thai language.

Researcher used multistage sampling technique. The investigator selected two cities by purposive sampling technique. Next, the students from standard XI from each school were selected by simple random sampling technique. In each school two groups, each of 30 students were formed. In this way, total 120 students were selected from two schools. The statistical technique t test was used to find out whether the mean scores of each group differ significantly or not. For the analysis and interpretation of data obtained from opinionnaire, mean and standard deviation were employed.

The researcher found that the developed Computer Assisted Instruction was found significantly effective in learning five topics of Thai and English subject and also opinion of students was found effective in presenting all the five topics of English and Thai language.

7. Rosales, J. S. (2005) throws light on the effect of Computer Assisted Instruction on the Mathematics achievement of ninth-grade high school students in the lower Rio Grande valley. The major objective of the study was to describe the effect of a Computer Assisted Instruction program had on the Mathematics achievement of ninth grade high school students in the lower Rio Grande Valley as measured by the state assessment. A quasi experimental pre test post test control group design with matching was used. ANCOVA procedures were used to determine the statistical significance.

The researcher found that the there is a statistically significant difference between the Mathematics achievement of ninth grade high school students in the lower Rio Grande Valley who have participated in Computer Assisted Instruction and
the Mathematics achievement of ninth grade high school students in the lower Rio Grande Valley who did not participate in Computer Assisted Instruction.

**2.3.2.2 CONCLUSIONS FROM STUDIES RELATED TO INSTRUCTIONAL PACKAGE ON MATHEMATICS:**

There are overall seven researches in this category, some are downloaded from the internet and some are selected from the publications. All the researches done in this category are related to experimental designs in the Mathematics subject. Some general conclusions drawn from this category are,

1. Intelligence had no change in achievement when taught by the guided discovery and expository approaches.

2. All the three strategies, namely, (a) lecture-discussion, (b) inductive-drill, and (c) auto- instruction group discussion, were found to be equally effective in terms of achievement in mathematics disregarding levels of intelligence, sex and personality type.

3. Dependence of the achievement of pupils on their I.Q. could be reduced considerably by using the strategy for mastery learning developed by the investigator.

4. the CAI strategies were superior to the traditional method instruction, and CAI with Teacher Support System (TSS) was more effective than CAI without TSS for underachievers (UA)

5. If the teaching is done through multimedia package than student can remember it for a longer time.

6. The Computer Assisted Instruction developed by the investigator was found significantly effective in learning five topics of Thai subject to the students.

7. There is significant difference between the Mathematics achievements who have participated in Computer Assisted Instruction and who did not participate in Computer Assisted Instruction.
2.3.2.3 COMPARISON OF STUDIES RELATED TO INSTRUCTIONAL PACKAGE ON MATHEMATICS WITH PRESENT RESEARCH:

- **Bhalwankar** A.G studied the Effects of Expository and Guided Discovery Methods of Teaching Mathematics on the Achievements of Students of Different Levels of Intelligence but it was for the subject of Mathematics for std. IX in Pune.

- **Chitkara** M. studied the Effectiveness of Different Strategies of Teaching on Achievement in Mathematics in Relation to Intelligence, Sex and Personality but it was for the subject of Mathematics for std. IX in Chandigarh.

- **Patadia** H.J. studied the Strategy for Mastery Learning in Fifth-Grade Geometry but it was for the subject of Mathematics for std.V in Baroda.

- **Rose** Antony Stella. V. studied the throws light on the application of computer Assisted Instruction (CAI) and the Teacher support system (TSS) for the optimum development of underachievers but it was for the subject of Mathematics for std. IX in Tamil Nadu State Board Schools.

- **Sindhi** N.O. studied the construction and try out of multimedia package for the teaching of physics in standard XI but it was for the subject of physics for std. XI in Baroda.

- **Suwana** R. studied the effectiveness of Computer Assisted Instruction for Primary School Students: An Experimental study but it was for the subject of Thai language for Primary in Buriram.

- **Rosales** J. S. studied the effect of Computer Assisted Instruction on the Mathematics achievement of ninth-grade high school students in the lower Rio Grande valley but it was for the subject of Mathematics for std. IX in Rio Grande Valley.

The present research work was related to development of Mathematics Experiment Notebooks for teaching upper primary classes and no one above research was related. Hence the present research work was different and new one.
2.3.2.4 REVIEW OF WORK DONE RELATED TO DEVELOPMENT AND USE OF SELF INSTRUCTIONAL MATERIAL:

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<th>Sr. No</th>
<th>Name of Researcher</th>
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Fig. 2.5

Review of Work Done Related to Development and Use of Self Instructional Material

1. **Nanavati, U.R., (1981)** has conducted study on Development of Learning Package on Population Education and the Study its Effectiveness. The investigator selected three schools—one each from a city, a town and a village. The multi-media package was tried on the pupils of Standard IX In each school two groups matched in
terms of age, sex, socioeconomic status, previous achievement scores and achievement scores on the special test on population education were formed for experimentation. The multimedia package under reference comprised a tape-recorded dialogue of three experts on population education, work books, three films (Danger Signal, Personal Hygiene, The Boat), and 18 slides, with relevant recorded commentary cassettes.

The major findings of the study were the use of learning packages in the teaching-learning process is an innovative strategy. This strategy, if planned effectively, could help in minimizing the expenditure on teaching and optimizing the use of technical expertise as well as human resources, thus resulting in both qualitative and quantitative improvement.


The aims of the research were to develop two types of instructional material, namely, material based on the Advance Organizer Model (AOM) and the Operant Conditioning Model (OCM).

The sample for the second stage comprised 139 students. The study was designed on the lines of post-test only control group design. Achievement was measured with the help of criterion tests developed by the investigator. A Reaction Scale was also developed by investigator for measuring reaction towards PLM and AOM separately. The data were analysed by computing mean, percentiles, and using 3 X 2 X2 factorial ANOVA with unequal cell size followed by t-test and chi-square technique.

The instructional materials PLM and AOM were found to be effective in terms of achievement of students with respect to intelligence. Further it was found that low intelligent students could be taught effectively with the help of AOM.

3. **Nagar, Nirmal,** (1988): conducted study on Researcher has examined the usefulness of computers in teaching mathematics, areas in mathematics,
which can be taught more effectively through computers and status of computer, aided teaching of mathematics. This is a survey report of three projects and ten research studies carried out in other countries. It will be useful if our research workers carry out similar research studies under Indian conditions.

The researcher found that the Computer Assisted Teaching (CAT) of mathematics benefited both the teacher and learner.

4. Gangopadhyaya, Tapan Kanti, (1991) studied the effectiveness of classroom teaching techniques in relation to student’s achievement. Researcher finds out the effectiveness of four techniques of teaching - 1. lecturing 2. lecturing and explanation 3. lecturing, explanation and questioning 4. Lecturing, explanation, questioning and answering. Sample of the study was 100 students in four groups. Major finding of the study was technique lecturing, explanation, questioning and answering showed more effective than other technique at the post test level.

5. Wagh, S. K., (1991) conducted the study related to the development of a multi-media instructional system for remedial measures for Class VIII students, in fractional numbers. The multimedia Instructional system contains the following instructional materials – charts, flash cards, slides, filmstrips, overhead projector, transparencies, audiocassettes, assignments, and self-learning programme booklets. This was an experimental research. Researcher used 2 x 2 x 6 factorial design in the investigation. The researcher conducted his experiment in two schools randomly selected by hat sample method. They were consisted of 407 students in Std. VIII. The data were analysed with the help of statistical and non-statistical measures. Scores in pre and posttest were tabulated. The techniques of analysis of variance and t-test were used to test the hypotheses.

The researcher found that the Traditional Instructional System (TIS) and the MIS remedial approaches both helped students in improving their performance on all the six computational skill in fractional numbers. The effect of the system on the performance of the students in fractional numbers was not dependent on (a) the sexes (b) levels of skills when sex-levels were averaged.

The sample of the study consisted of 220 students from four selected higher secondary schools, covering the good, average and poor school of the Bhilai steel Plant. Bhilai. (M.P)

The researcher found that the students who used the computer scored significantly higher than those taught mathematics through the conventional method. Achievement in mathematics was found to be independent to the sex factor.

7. Bhave Balkrishna (2002) conducted a comparative study of the effectiveness of teaching mathematics by computer assisted instruction and traditional method. This research deals with the comparison of CAI with the traditional instruction in terms of their effectiveness in teaching Mathematics. This study was restricted to three units of IX class Algebra textbook. The two groups were taught separately during the period of the study by the same teacher (by the researcher). The survey and interview method was used for studying the problems of teachers to use CAI for teaching Mathematics. 35 teachers were asked to fill in a questionnaire specially prepared for this purpose containing 15 questions and they were interviewed.

To obtain feedback from the students about their problems in using CAI for learning Mathematics, a questionnaire was developed. The questionnaire containing 15 questions was developed and then distributed among the 28 students in the experimental group who worked on computers during the process. He concluded that the experimental group obtained a higher mean than the control group.

He has suggested developing various CAI programmes for every standard and every subject area of curriculum.
8. Sarvankar S.M. (2007) studied the development of computerised self instructional material for std. VIII Mathematics through multimedia. For the study, two groups of students of std. VIII Mathematics were formed consisting equal number of both low and high achievers. It was found that there was significant difference between the two groups in achievement scores. The researcher asserted that learning through computerised self instructional material enhanced better learning than the conventional method.

9. Patil A.T. (2007) investigated the effectiveness of multimedia Instructional System in learning ICT as compared to traditional method for B.Ed. Pupil Students. For the study, two groups of students of the B.Ed classes were formed consisting equal number of both low and high achievers. It was found that there was significant difference between the two groups in achievement scores. The researcher asserted that learning through multimedia Instructional System (MIS) enhanced better learning than the traditional method.

10. Mudasiru Olalere Yusuf, (2010) investigated the effects of computer assisted instruction (CAI) on secondary school students’ performance in biology. Also, the influence of gender on the performance of students exposed to CAI in individualised or cooperative learning settings package was examined. The research was a quasi experimental involving a 3 x 2 factorial design. The sample for the study comprised 120 first year senior secondary school students (SSS I) sampled from three private secondary schools, in Oyo State, Nigeria. The students’ pre-test and post test scores were subjected to Analysis of Covariance (ANCOVA). The findings of the study showed that the performance of students exposed to CAI either individually or cooperatively were better than their counterparts exposed to the conventional classroom instruction. However, no significant difference existed in the performance of male and female students exposed to CAI in either individual or cooperative settings. Based on the research findings recommendations were made on the need to develop relevant CAI packages for teaching biology in Nigerian secondary schools.
2.3.2.5 CONCLUSIONS FROM STUDIES RELATED TO DEVELOPMENT AND USE OF SELF INSTRUCTIONAL MATERIAL:

There are overall eight researches in this category, some are downloaded from the internet and some are selected from the publications. All the researches done in this category are related to mathematics experiment notebook. Some general conclusions drawn from this category are,

1. The learning package was more effective than the traditional method in teaching the content of 'Population Education' to the pupils of Class IX.

2. The PLM as well as AOM were found superior to the traditional method, and PLM and AOM were equally effective when students' mean achievement scores were adjusted with respect to intelligence. On the other hand, when the overall mean achievement score of students was not adjusted with respect to intelligence, AOM was found to be superior to PLM. But AOM as well as PLM were superior to the traditional method.

3. Computer Assisted Teaching (CAT) of mathematics benefited both the teacher and learner.

4. The techniques lecturing, explanation, questioning and answering were showed more effective than other techniques.

5. The Traditional Instructional System (TIS) and the MIS remedial approaches both helped students in improving their performance on all the six computational skill in fractional numbers.

6. The students who used the computer scored significantly higher than those taught mathematics through the conventional method.

7. The study showed that the performance of students exposed to CAI either individually or cooperatively were better than their counterparts exposed to the conventional classroom instruction.

From the review of the studies in Mathematics Education it is clear that Multimedia Instructional System and Computer Assisted Instruction are more effective in remedial teaching, conventional method and Computer Assisted Teaching instruction in teaching mathematics. But there is no single study, which is directly
related to Development of Mathematics Experiment Notebook for Upper Primary Level.

2.3.2.6 COMPARISON OF STUDIES RELATED TO DEVELOPMENT AND USE OF SELF INSTRUCTIONAL MATERIAL WITH PRESENT RESEARCH:

- **Nanavati** U.R. studied the effectiveness of Development of Learning Package on Population Education but it was for the subject of Population Education.

- **Buddhisagar** M. studied on Development and Comparison of Instructional Material Developed by Using Advance Organizer Model and Operant Conditioning Model for Teaching Educational Psychology to B.Ed. Students but it was for the subject of Educational Psychology for B.Ed. Students in Department of Education, Devi Ahilya Vishwavidyalaya, Indore.

- **Nagar** Niramal studied the Effectiveness of Computers in Teaching Mathematics in Schools but it was for the subject of Teaching Mathematics in Delhi.

- **Gangopadhyaya** Tapan Kanti has examined an experimental study of the effectiveness of classroom teaching techniques in relation to student’s achievement but it was for the subject of classroom teaching techniques in Calcutta.

- **Wagh S. K.** has studied the development of a multi-media instructional system for remedial measures for Class VIII students, in fractional numbers but it was for the subject of Mathematics in Sangli.

- **Singh R. D.** have studied on the problems of the effectiveness of computer-assisted instruction and of the conventional method of instruction in teaching mathematics, in terms of achievement in mathematics and direction of change in attitude towards mathematics of male and female students but it was for the subject of Mathematics of higher secondary schools in Bhilai. (M.P).

- **Sarvankar S.M. and Patil A.T.** has studied the effectiveness of SIM and of the conventional method in relation to student’s achievement but it was for the Mathematics and B.Ed.college ICT subject respectively.
• **Mudasiru Olalere Yusuf** has investigated the effects of computer assisted instruction (CAI) on secondary school students’ performance in Biology but it was for the subject of Biology of secondary schools in Oyo State, Nigeria.

The present research work was related to development of Mathematics Experiment Notebooks for teaching upper primary classes and no one above research was related. Hence the present research work was different and new one.

2.4 **GENERAL CONCLUSIONS FROM REVIEW:**

From the reviews of literature and researches, the researcher studied what researches had published about Mathematics Experiment Notebook and after going through these researches, the researcher had drawn some conclusions which are discussed below.

1. In India and abroad various computers assisted instructions are developed.
2. Very few experimental researches with development of package are done.
3. The researches were done for the old syllabus.
4. The use of mathematics laboratory enhanced achievement in mathematics.
5. Experimental teaching method was more effective than teacher-centered traditional teaching method in the knowledge and comprehension level.
6. School can use technology more effectively and teachers need continuing training as the technology changes.
7. In traditional system the students have to listen and understood.
8. In developed instructional material they had their own time to go through matter and understand well.
9. SIM is found to be more effective than traditional method and Student’s shows better performance.
10. The SIM is effective in achieving the mastery over the respective theory.
11. CAI Method is found to be more effective than traditional method.
12. The groups through CAI showed a substantial progress.
13. Computer can be used as a tool or support material to teaching and learning of Mathematics.

14. The techniques lecturing, explanation, questioning and answering were showed more effective than other techniques.

15. The teaching is done through multimedia package than student can remember it for a longer time.

2.5 RATIONAL FOR THE PRESENT STUDY:

Taking into consideration findings of related literature, the researcher found that many of the researches are related to CAI, CAL, SIM and Self learning Package. These are useful for more effective teaching as well as for understanding the content of subject. Perhaps the experiments are needed to be conducted to verify the result and this could be important while trying. The student would be enjoying learning, which in turn may inspire the teacher to try for excellence.

There are different studies related to Mathematics and multimedia package but they are not directly related to the package used in this study. Thus it reveals the importance and need of the present study. It is found that none was related to development of Mathematics Experiment Notebook to Upper Primary Level students; it carries its own importance. Therefore it can be stated that the present research work is different new and original. Therefore, the researcher decided to develop the Mathematics experiment notebook for teaching upper primary school pupils.

2.6 CONCLUDING REMARKS:

Thus, in this chapter a brief review of the related literature and researches has taken. They were from various areas. Though these areas were related to the present study, researcher found that none of the study was directly related to development of Mathematics Experiment Notebook to Upper Primary Level students. Hence it can be claimed that the present research is original, novel and unique.

It is essential to know about plan and procedure followed for the Development of Mathematics experiment notebook for upper primary level. In the next chapter the researcher has discussed the plan and procedure for present research work.