CHAPTER- II

REVIEW OF RELATED LITERATURE

Introduction

In this chapter an attempt has been made to review the related literature pertaining to the effect of varied ICT Instructional Approaches on academic achievement and retention among Secondary School Students. The review of related literature has given an understanding of previous work and equips the investigator with new understanding and insight.

The research studies reviewed are presented below:

1) **Das (1998)** conducted study on “Exploring effectiveness of computer assisted learning material on Rhymes in different modes”. This study aims (1) To develop computer software on rhymes in text, graphics-text, text-music, graphics text music, and graphics-text-music- recital modes. (2) To study the effectiveness of CALM prepared in different modes for learning the Rhymes in terms of Word meaning (lexicon), Analytical understanding, Comprehensive understanding, Writing ability, Recitation ability and LSRW ability. **Hypotheses: 1.** The adjusted mean of the achievement test score on word meaning, analytical Understanding, Comprehensive understanding, writing ability, recitation ability, and language learning of the students belonging to Text, Graphics Text, Text Music, Graphics Text Music, and GTMR modes will not differ significantly when class achievement test score in English language is considered as covariate. **Sample:** Seven rhymes were presented in 5 different modes, namely, T, GT, TM, GTM, and GTMR to 5 different groups of students, respectively, drawn from a total of 169 students of Second Standard of Baroda High School, Bagji Khana (1996-97) on the basis of systematic random sampling. Each group comprised of 20
students. **Tools and Techniques:** The investigator used two tools for the study, namely, the treatment tool and testing tool. The treatment tool was the Computer Assisted Learning Material (CALM) on rhymes developed by the researcher in different modes. Testing tool was an achievement test developed by the investigator. **Data Analysis Technique Used:** ANCOVA was used considering English Language class achievement test scores as covariate. **Findings of the Study:** (1) Composite modes of presentation may not ensure higher cognitive language learning. (2) Intelligibility of a message is a function of sender, message, medium, mode, receiver, and the environment. **Implications of the study:** (1) It is beneficial for the learners to learn through CALM. So, CALM should be developed and used for language learning. (2) Choice of a mode of instruction should be guided by the objectives of instruction

2) **Thatte (1998)** conducted study on “An Experimental Study of the Relative Effectiveness of Programmed Learning and Learning Through Audio Visual Aids with reference to certain selected topics from the syllabus of Science for Std. V to VII in Greater Bombay”. This study aims (1) To compare the mean achievement scores of the students of Std. V, VI, and VII studying through AV Aids method, Programmed Learning Method and Traditional method. (2) To study the effect of treatment, sex, and their interaction on achievement. **Sample:** Eight Schools of Greater Mumbai were selected in all. Twenty four different classes were considered and the total number of students was 1381. **Tools:** The question papers set by the investigator based on the topic were used as tools for data collection. **Data Analysis:** Central tendencies, percentile and percentile ranks, SD, ANCOVA and t test were used for data analysis. **Findings:** (1) AV aids method was found to be significantly more effective than the Programmed Learning Method and the Traditional method in terms of achievement at Std. V, VI,
and VII. (2) Programmed Instruction Method was found to be significantly more effective than the Traditional Method in terms of achievement at Std. V, VI, and VII. (3) Programmed Learning Method and Audio Visual Method are more successful when the classes are small, at the same time they are more effective for average students. (4) Male students and female students, both, equally benefited through the AV method as well as Programmed Learning Method. No significant effect of interaction between treatment and sex was found on the achievement of students.

Khirwadkar (1999) conducted study on “Developing a computer software for learning Chemistry at Standard IX”. This study aims
(1) To develop CAI package in subject of Chemistry for standard XI Science Students studying GSTB syllabus. (2) To study the effectiveness of the developed software in terms of instructional time and achievement of students. (3) To study the effect of software package on students’ achievement in relation to students’ intelligence level, motivation level, and attitude towards the package. (4) To study the attitude of the students and teachers regarding the effectiveness of the CAI package with respect to contents, presentation, examples, illustrations, graphs and figures, evaluation items, utility of software and instructions given in the instructional manual. Sample: One of the English medium schools of Baroda City was taken for implementing the developed software. One section of Standard XI Science was taken and thirty students were selected randomly as sample for the experimental group and rest of the students of the section constituted the control group. Experimental Design Employed: A pre-test post-test experimental and control group design was employed. Tools and Techniques: The software developed by the investigator was used as treatment tool. Achievement test Constructed by the investigator was used as a testing tool. Data Analysis: The data were analysed through
ANOVa, ANCOVA and content analysis. **Findings**: The developed software package was found to be effective in terms of academic achievement of the students. The students and teachers were found to have favourable opinion towards the software package. There was found an interaction effect of IQ, motivation and opinion of students on their academic achievement.

4) **Zyoud, (1999)** conducted study on “Development of Computer Assisted English Language Teaching for VIII Standard Students”. This study aims (1) To develop a computer assisted English Language Teaching Programme for Standard VIII Gujarati medium students. (2) To Study the effectiveness of the Computer Assisted English Language Teaching Programme on student achievement in terms of vocabulary, grammar and comprehension by taking pre-test scores and IQ as covariates. (3) To study the effectiveness of the Computer Assisted English Language Teaching Programme on the experimental group students’ achievement in vocabulary, grammar and comprehension with respect to their intelligence, motivation and attitude. (4) To study the attitude of the students towards the usefulness of the computer assisted English Language Teaching Programme. **Findings**: The study reveals that when the computer is used to its full potential, it can help the students achieve more in learning vocabulary, grammar and comprehension to the learners with different IQ, motivation and attitude. It helps the students learn better because it provides them with a lot of freedom and responsibility to learn at their own pace. The students were found to have +ve attitude towards Computer Assisted English Language instruction.

5) **Sarangi (2000)** conducted study on “Exploring cognitive map formed due to educational video viewing among learners”. This study aims (1) To study the effects of TV Language proficiency, viewing strategy, and their interactions on the components
(Concept, proposition and schema) of cognitive map in terms of corresponding map scores taking intelligence as a covariate. (2) To study the effects of television language proficiency (TLP) and viewing strategy and their interaction on cognitive map (total score) taking intelligence as a covariate. (3) To analyze the cognitive maps of the different television language groups in relation to different production variables namely, message track, message presentation form and message type. (4) To analyze the cognitive maps of learners of the treatment (VS) groups in relation to different production variables namely, message track, message presentation form and message type. (5) To analyze the learning distortions in the cognitive maps of the students in relation to viewing strategy, television proficiency and production variables namely, message track, message presentation form and message type. Population & Sample: Sample of ETV Programme: Six ETV programmes for class VIII, produced and telecast by the SIET, Orrisa, Bhubaneshwar were selected, namely, The Living Fossils, Composition of water, The environment, Properties of water, The Dust particles, and Thermal expansion of matter. Intact classroom groups were used as the sample groups (composition of sample students from rural and urban background was deliberately manipulated to ensure a fine dispersal of TLP) the number of students for difference ETV was different and ranged from 155- 170. Tools and Techniques: Intelligence was measured with the Raven’s standard progressive matrices and Television Language Proficiency with a standardized Television Language proficiency Test (TLPT). Cognitive map data were collected through cognitive map inventories and subsequent ratings were done with rating scale. Findings: Children’s learning through the ETV programmes was found to be positively influenced by their Television Language Proficiency. The Television viewing strategies, namely, Direct Viewing, Viewing with Note
taking, and Advance Organizer followed by Viewing produced similar influences on cognitive map formation among the learners. The ideal cognitive maps of the sample ETV were transacted more at the concept level than at the Proposition Level. In most cases distorted transaction of the message items was more than the meaningful transaction. Learners cognitive maps contained large amount of feeble and blurred concepts and proposition, chiefly inadequate Learning, idiosyncrasies, confusion, some amount of over-learning and marginal overgeneralization. Meaningful and distorted transaction of the concepts and propositions exhibited distractive relations with message type, message form and message track. These basic relations could be instrumental for improving educational tele-production and to make TV a more potential institutional medium. The study further sensed possibilities of relationship among cognitive mapping, the said production variables and tele-instruction strategies which need further probing. This is felt that tele-visual instructional designs in general and the process of message mediation in particular need reexamination for effective education of children.

6) **Samal, (2000)** conducted study on “Effectiveness of the School Broadcast Programmes of All India Radio (AIR) and Educational Television (ETV) Programmes of Doordarshan with reference to school achievement of the learners”. The purpose of this study was
   (1) To study the achievement of Primary School Students on ETV Programmes. (2) To study the reactions of Primary School Teachers on ETV Programmes. (3) To study the reactions of the students on ETV programmes. (4) To study the achievement of Primary School Students on School Broadcast Programmes. (5) To study the reactions of Primary School Teachers on School Broadcast Programmes. (6) To study the reactions of the students on School Broadcast Programmes. **Sample:** A sample of 120 students and 20
teachers has been used for the study. Also, 20 ETV Programmes and 10 Educational Radio Programmes were selected for the study. Six tasks were constructed for the study. Tools and Techniques: The achievement tests were constructed for the study. Data Analysis: The data were analysed both quantitatively and qualitatively. Findings: (1) Both the ETV and School Broadcast programmes have been found to have positive effect on school achievement of pupils. (2) There have been found mixed reactions of students and teachers regarding contents and presentation of the ETV and School Broadcast Programmes. (3) It is really a matter of concern that none of the schools was found utilizing the ETV and School Broadcast Programmes in an institutionalized manner. 7) Jones and Jo et al. (2000) conducted study on “The Evolution of a Multimedia Delivery System and its Effects on Student Perception and Performance”. In teaching a multimedia course it is important and relevant to apply what you are teaching. As a result, the first year Multimedia course offered through Griffith University (Gold Coast) has been through many changes since it was first offered. The course content remains relatively constant, allowing for software upgrades and new and more suitable software. However, over the last few years the mode of delivery has evolved to a combination of online and traditional approaches, more appropriate to teaching a subject of this nature. This paper will review the evolution of the teaching environment and delivery modes used in a multimedia course between 1998 and 1999, and analyse the impact of the change. Computer and Internet access are not only essential elements in a subject of this type but also in the general academic and business environment. Multimedia students are expected to know and understand the technologies of their field. During this research it was found that the progression of this course had taken on an evolutionary quality. The old adage
“Necessity is the mother of invention” could be seen here. A more complex system was required to cater for the needs of the students. As student enrolment in this course grows with each semester, the online delivery of lectures will enable the educators to accommodate the requirements of the students.

8) **Nutta (2000)** conducted study on “Is Computer-Based Grammar Instruction as Effective as Teacher- Directed Grammar Instruction for Teaching L2 Structures?”. The study described here compared postsecondary English as a Second Language (ESL) students’ acquisition of selected English structures based on the method of instruction—computer-based instruction versus teacher directed instruction. The population of the study consisted of 53 students (24 females and 29 males) enrolled in an intensive academic ESL institute at a major university in Florida. The independent variable was the method of grammar instruction, either teacher-directed or computer-based. The dependent variables were students’ achievement scores on three separate criterion-referenced tests over the selected structures. The pretests were administered three days prior to the beginning of the treatment, the immediate posttests were administered on the last day of the treatment, and the delayed posttests were administered two weeks after the posttests. The results showed that for all levels of English proficiency, the computer-based students scored significantly higher on open ended tests covering the structures in question than the teacher-directed students. No significant differences were found between the computer based and teacher-directed students’ scores on multiple choice or fill-in-the-blank tests. The results indicate that computer-based instruction can be an effective method of teaching L2 grammar.

among High School Students”. The purpose of this study was (1) To find out the influence of computer-based multimedia programme on achievement in mathematics among high school students; (2) to find out the difference in achievement in mathematics between high achievers and low achievers from both relative retention of learning in mathematics. Method: Experimental method and quantitative method was adopted for the study. A sample of 62 students studying in Class IX, Madras were selected for the study. The probability sampling method chosen for the study. Attitude Scale used for data collection. Findings: (1) There is no influence of computer-based multimedia programme on the achievement in Mathematics among high school students. (2) There is no significant change in their attitude towards mathematics after learning Trigonometry through computer-based Multimedia and text-based self-study material. (3) There is no significant difference in achievement of mathematics between high achievers and low achievers for both experimental and control groups. (4) There is no significant difference in the retention of learning in mathematics between the experimental group and control group. Three references were cited in the study.

10) **Tare, (2001)**, conducted study on “A Study of the Effectiveness of Branching Variety of Programmed Instructional Material as Diagnostic and Remedial Tool in Chemistry for Secondary Classes in Jabalpur Division”. This study aims (1) To compare the achievements of the students of urban and rural areas of Jabalpur Division by the traditional method of teaching with that of studying through branching frames of programmed learning in Chemistry Subject. (2) To diagnose the weakness of the students of urban and rural areas with the help of PLM. Research Design used: Experimental and Control Group Design was used for the purpose of this study. Sample: 280 students were selected from different
Government Higher Secondary Schools of urban and rural areas of Jabalpur Division. **Tools and Techniques:** A branching programme was developed on Atomic Structure and Chemical Bonding and pre-test and post-test were constructed by the investigator. **Data Analysis:** ANOVA and t-test were used for data analysis. **Findings:**

1. The achievement of the experimental group was found significantly greater than the achievement of the control group.
2. The achievement of the urban girls through PLM was found significantly higher than that of the urban boys.
3. No significant difference was found in the achievement of boys and girls of rural areas in the post-test on atomic structure and chemical bonding.
4. 135 boys out of 180 and 64 girls out of 99 wanted to continue the study with the PLM on both the topics.
5. The weakness of individual students were diagnosed and removed when branched frames on both the topics were administered.

11. **Corbett and Willms (2002)** conducted study on “Canadian Students’ Access to and Use of Information and Communication Technology”. This study investigates the extent to which students have access to computers and the Internet, whether access is related to their sex or socioeconomic status, and for those who have access to computers how they tend to use them. The analysis is based on the responses of nearly 30,000 15-year old Canadian students who participated in the Programme for International student Assessment (PISA). The findings indicate that nearly 9 out of every 10 (88%) of Canadian students have a computer at home, and 8 of every 10 (81%) use a computer at home nearly every day. However, students from low socioeconomic families were less likely to have access to computers and a link to the Internet at home. Females were also less likely to have access to computers and the Internet at home but these disparities were negligible for students in high socioeconomic status families. Students reported that they
use computers mainly for accessing information on the Internet, communication, word processing, and games. Less than one-third of students who used computers reported that they used them to help them learn. Our conclusions argue that universal access at home is within reach and is essential if computers are to become a learning tool aimed at improving students’ skills.

12) Waxman and Michko et al. (2003) conducted study on “A Meta-Analysis of the Effectiveness of Teaching and Learning With Technology on Student Outcomes”. The purpose of this study was to estimate the effects of teaching and learning with technology on students’ cognitive, affective, and behavioral outcomes of learning. 282 effect sizes were calculated using statistical data from 42 studies that contained a combined sample of approximately 7,000 students. The mean of the study-weighted effect sizes averaging across all outcomes was .410 ($p < .001$), with a 95-percent confidence interval (CI) of .175 to .644. This result indicates that teaching and learning with technology has a small, positive, significant ($p < .001$) effect on student outcomes when compared to traditional instruction. The mean study-weighted effect size for the 29 studies containing cognitive outcomes was .448, and the mean study-weighted effect size for the 10 comparisons that focused on student affective outcomes was .464. On the other hand, the mean study-weighted effect size for the 3 studies that contained behavioral outcomes was -.091, indicating that technology had a small, negative effect on students’ behavioral outcomes. The overall study-weighted effects were constant across the categories of study characteristics, quality of study indicators, technology characteristics, and instructional/teaching characteristics.

13) Malliga (2003) conducted study on “Relative Effectiveness among Different Strategies of Computer Mediated Multimedia Presentation
in Teaching and Learning of Chemistry at Higher Secondary Stage”. The aim of this study was (1) To study relative effectiveness among PBL (Peer-based Learning), ILMMP (Individualised Learning supported by Multi Media Presentation), IILMMP(Interactive Individualised Learning supported by Multi Media Presentation) in terms of development of cognitive skills at different levels of knowledge, understanding and application among the students of Class IX as measured by post-test and retention test; (2) to study whether there is any significant difference among the instructional strategies, viz. PBL, ILMMP and IILMMP with regard to computer attitude and scientific attitude. Method: Quasi experimental method was adopted for the study. Qualitative and quantitative approaches were adopted for the study. A sample of 108 girl students from Vellalar Matriculation and Higher Secondary School, Erode district in Tamil Nadu was taken, using probability sampling technique for the study. The Tools used for the study were an achievement test (Self-made tool), Criterion Referenced Test, Scientific Attitude Test (Bhasksrarao and Marlow Ediger), and Computer Attitude Scale (Niel Selwyn) used in the study. The ‘t’ test and ANOVA were used for data analysis in the study. Findings: (1) It is concluded that Interactive Individualising Learning supported by Multi Media Presentation (IILMMP) was found to be the most effective strategy among all the three different instructional strategies, viz. PBL, ILMMP and IILMMP in term of cognitive skills such as knowledge, understanding and application in realising the instructional objectives in Chemistry at Class IX. (2) PBL was found to be coming between IILMP and ILMMP in enhancing the retention of what have already been learnt. (3) It was inferred that irrespective of the difficulty level of the content, IILMMP was to be most effective one while ILMMP was the least effective one. (4) It was found that while the subjects of all the
three experimental groups were identical in terms of their scientific attitude, the same was found to be nonidentical in terms of their computer attitude. (5) The results of the study indicated that the enhancement of learning Chemistry was only due to the media effectiveness. Computer Mediated Multi Media Based Instruction can be introduced in education at all level for the successful realisation of instructional objectives. One hundred two references were cited in the study.

14) **Desai (2004)** conducted study On “A Comparative Study of the Efficacy of Teaching Through the Traditional Method and the Multimedia Approach in the Subject of Home Science.” The aim of this study was 1) To develop a multimedia package for teaching the subject of nutrition (Protein) to the undergraduate level students of Home Science. (2) To find out the effectiveness of the multimedia package in terms of achievement of the students. (3) To find out the effectiveness of the lecture method and practical method used in the teaching of Home Science. (4) To compare the achievement of the students learning through the multimedia approach and the traditional way of teaching. (5) To study the effect of caste on the acquisition of knowledge through traditional teaching methods and multimedia approach. (6) To study the effect of location on the acquisition of knowledge through traditional teaching methods and multimedia approach. (7) To study the effect of income on the acquisition of knowledge through traditional teaching methods and multimedia approach. (8) To study the effect of achievement at the Std. XII examination on the acquisition of knowledge through traditional teaching methods and multimedia approach. (9) To study the effect of intelligence on the acquisition of knowledge through traditional teaching methods and multimedia approach. (10) To study the opinions of students about learning through multimedia approach. **Research Design:** It is an experimental
study which has employed experimental group and control group design. **Sample of the Study:** The sample of the study is constituted of 98 students of B.A. first year home science (2001-2002) of Smt. J.P. Shroff Arts College, Valsad. **Tools and Techniques:** The multimedia package constituted of transparencies, pie graph, charts, diagrams, pictures, video tape, audio tape, and slide set has been well developed by the investigator. All the tests pre-test, post-test, retention test and opinionnaires have been well constructed by the investigator. The intelligence test by Dr. K.G. Desai has been suitably selected. The experiment has been conducted systematically. **Data Analysis:** T-test and F-test were appropriately employed for data analysis. **Findings of the Study:** The mean achievement of the experimental group was found significantly higher than that of the control group. From post-test to retention test almost equal reduction in performance was found in both the groups. The study has arrived at significant findings when caste, location, income, Std. XII examination marks, and IQ of the students were considered as co-variables. The students were found to have favourable opinions towards the multimedia approach. The study has found the relative efficacy of teaching through the traditional method and the multimedia approach in the subject of Home Science, particularly, Proteins. The investigator has tried to observe the research rigor throughout.

15) **Ruttanathummatee (2004)** conducted study on “Effectiveness of Computer Assisted Instruction for Primary School Students: An Experimental Study”. The purpose of this study was (1) To develop Computer Assisted Instruction in the Subject of Thai language for the students of Pratom-3 and 6. (2) To know the effectiveness of Computer Assisted Instruction in the subject of Thai language developed by investigator for the students of Pratom-3. (3) To know the effectiveness of Computer Assisted Instruction in the subject of
Thai language developed by investigator for the students of Pratom-6. (4) To know the effectiveness of Computer Assisted Instruction in the subject of English language developed by ONPEC for Pratom-3. (5) To know the effectiveness of Computer Assisted Instruction in the subject of English language developed by ONPEC for Pratom-6. (6) To compare the effectiveness of Computer Assisted Instruction developed by ONPEC in English language with the CAI developed by the investigator in the Thai language for Pratom-3. (7) To compare the effectiveness of Computer Assisted Instruction developed by ONPEC in English language with the CAI developed by the investigator in the Thai language for Pratom-6. (8) To get opinion of the teachers on CAI developed by the investigator for the subject of Thai language. (9) To get opinion of the teachers on CAI developed by the ONPEC for the subject of English language. (10) To get opinion of the students on CAI developed by the investigator for the subject of Thai language. (11) To get opinion of the students on CAI developed by the ONPEC for the subject of English language. 

Research Design: It is a developmental-cum-experimental study. Pre-test, Post-test design with replication groups was used for conducting the experiment. Two experimental groups along with eight replication groups, each consisting of 30 students were well drawn. Sample of the Study: The sampling technique employed for the study is quite appealing. In all 150 students of Pratom-3 and 150 students of Pratom-6 belonging to Buriram Province participated in the study.

Tools and Techniques: CAI programmes on 5 units for learning each language were used for conducting the experiment. Different tools for the study, namely, criterion tests and opinionnaires have been used. Data Analysis: The data have been suitably analyzed through mean, SD and t-tests. Findings of the Study: The study has resulted in the development of CAI Programmes on selected five
units of Thai language both for Pratom-3 and Pratom-6. The CAI Packages developed by the investigator on Thai language have been found effective at both the levels, that is, Pratom-3 and Pratom-6 as evident through the t-values with the students of Buriram Kindergarten with Experimental Groups 1 and 2. The CAI Packages developed by the ONPEC on English language have been found effective at both the levels, that is, Pratom-3 and Pratom-6 as evident through the t-values with the students of Buriram Kindergarten with Experimental Groups 1 and 2. The CAI Packages developed by the investigator on Thai language and ONPEC on English language have been found equally effective at both the levels in Buriram Kindergarten. The CAI Packages developed by the investigator on Thai language and by the ONPEC on English language were found significantly and equally effective with all the eight replication groups. The CAI Packages developed by the investigator on Thai language and by the ONPEC on English language received favourable opinions both by the teachers and students.

16) **Cavaagls and Karaoglan et al. (2004)** conducted study on “The Use of Information Communication Technologies in Primary science : Education: A New Teaching and Learning Approach”. The project aims at designing an educational model for science education that deploys active learning concepts in school and home environments and assesses the effects of the model on the learning of the children. To achieve this, a science topic was selected for 6th graders and some microworlds were either developed or downloaded from the Internet. All the materials were uploaded on the course web page. E-mailing was used as a medium of interaction. For three weeks, ICT-based and traditional education was practiced with both the experimental and the control groups. It was found that ICT based science education has
a positive impact on the learning of children. It was also observed that children in the experimental group are more willing to participate in the class discussion.

17) Chamnan (2004) conducted study on “A Study of Availability And Utilization of Educational Media in Secondary Schools of Thailand” This study aims (1) To find out the available various educational media in Secondary Schools of Region- 12 of Thailand. (2) To find out the suitability of educational media as per the needs of the Secondary Schools of Region- 12 of Thailand. (3) To find out the utility of available educational media for various selected subjects in the Secondary Schools of Region- 12 of Thailand. (4) To find out the satisfaction of teachers and media in charge in the use of educational media in classroom instruction. (5) To find out the problems in the use of educational media in classroom instruction related to: i. Physical facilities ii. Technical Supporting Staff and iii. Administration in the Secondary Schools of Region- 12 of Thailand. (6) To find out the available various software as per the needs of the Secondary Schools of Region- 12 of Thailand. (7) To find out the suitability of software as per the needs of the Secondary Schools of Region- 12 of Thailand. (8) To find out the utility of software as per the needs of the Secondary Schools of Region- 12 of Thailand. (9) To find out the satisfaction of the students in the availability and use of software in teaching of the following subjects: i. Science ii. Math iii. Thai Language iv. Social Science v. English vi. Agriculture vii. Business viii. Health/Sport and ix. Computer. (10) To find out satisfaction of the teachers on the availability and use of software in teaching. Findings of the Study: A majority of the respondents have accepted the suitability of the available media in the schools. Majority of the teachers have showed their satisfaction in the use of educational media. 50% of the sample schools were found to have physical problems, mostly
related with physical facilities of the classroom and laboratory. Such schools were not having sufficient and workable equipments, software, and infrastructure. The modern media were found to face more of problems as compared to traditional media in terms of skilled human resource. The problems related to administrative system were mostly related with the non-cooperative behaviour or due to less insight of the administrators. The problems related to supporting staff were mostly related with the proper full time appointment of the technical person. The educational media were found largely under used. The power point, CAI, and CMI were never used in their schools as responded by about 20% of the teacher sample. Suitability of available software related to Thai and English languages was perceived less as compared to other subjects. Availability of high tech media was greater in big size schools as compared to the medium and small size schools.

18) *Kusum, (2004)* conducted study on “Development of an IT enabled Instructional Package for Teaching English medium students of Vadodara city” The objectives of the study were to develop an IT-enabled instructional package for teaching English Grammar, to implement it and to determine its effectiveness in terms of achievement of the students and opinions of students and English Teachers. The investigator started with a null hypothesis that there will be no significant difference in the mean achievement scores of students in pre-test and post-test. A single group pre-test and post-test design was employed for the study. 20 students were randomly selected from Std. VIII of the New Era Senior Secondary School, Baroda. Pre-test, post-test and opinionnaire were used for the study. The data were analysed through ‘t’ test, % scores and content analysis. There was found a significant gain in terms of students’ achievement through IT-enabled instructional package. It helped the students to learn kinds of sentences, namely,
interrogative, assertive: affirmative, negative, imperative: orders or commands, and exclamatory. The students and teachers were found to have favourable opinion towards the developed instructional package.

19) **Shah (2005)** conducted study on “ICT awareness, use and need of secondary and higher secondary teachers of English Medium Schools of Vadodara city”. This study aims to investigate the ICT awareness of secondary and higher secondary teachers, to study the ICT use of secondary and higher secondary teachers, to study the ICT need of secondary and higher secondary teachers, and to study the variables related with the ICT awareness, use and need of secondary and higher secondary teachers. A scale was constructed to collect the data regarding ICT awareness, use and need of a teacher with respect to different components of ICT, like, computer, Internet, OHP, LCD Projector, Radio, TV. 12 secondary and 10 higher secondary schools were selected using stratified random sampling technique. Further 60 secondary and 50 higher secondary teachers were selected 5 teachers from each selected school. A total of 90 teachers out of 110 responded. Data were analyzed using frequency, percentage, mean, SD, SE of mean, ‘t’ value and ANOVA wherever necessary. There was found a low degree of ICT awareness, use and need of secondary and higher secondary teachers. The variables related to ICT awareness of teachers were teaching experience, age and total salary. The variables related with the ICT use of teachers were total salary and computer training. The variable related with the ICT need of teachers was the Degree Program which they attended at the University level.

20) **Barot (2005)** conducted study on “A study of the effectiveness of CAI in Sanskrit for std. VIII students”. The study was conducted to develop CAI in Sanskrit for Std. VIII students and to study its
effectiveness in terms of mean achievement of students in Sanskrit and to study the reactions of the standard VIII students regarding the effectiveness of the developed CAI package. 86 students of Std. VIII of Shree Ambe Vidyalaya, Waghodia Road, Baroda constituted the sample for the study. A single group pre-test and post-test design was employed for the study. Achievement test and reaction scale were constructed by the investigator. Flash MX, Corel Draw 11 and Front Page were used for the development of software. ‘t’ value, frequencies and % responses were used for data analysis. The developed CAI in Sanskrit was found effective in teaching Sanskrit to VIII std. students. The reactions of the students towards the developed CAI in Sanskrit were found positive.

21) **Mork (2005)** conducted study on “ICT in Science Education Exploring the Digital Learning Materials at viten”. The purpose of this study was to investigate how the Viten program *Wolves in Norway* functioned in a classroom setting. The participants in this study are 59 students in two 9th grade classes from a culturally mixed school in a city of Norway. Our results show that there is a qualitative difference in the students’ answers to open-ended questions before and after the work with *Wolves in Norway*: the posttest answers are more specific, containing examples, claims are often backed up by reason, and the students are using biological concepts like predator, prey, population and rabies in contrast to the more general pretest answers that are often dressed in an emotional language.

22) **Rathod (2005)** conducted study on “Development and Implementation of an Information Technology Based Instructional Package for English Grammar to Gujarati medium students of Standard VIII of Jamnagar City” The objectives of the study were to develop an IT based instructional package for teaching English Grammar to Gujarati medium students of standard VIII, to study
the effectiveness of the developed IT based instructional package in terms of the achievement of the students, and to know their reactions on the developed instructional package. Pretest post-test control group design was employed for the study. The development of the IT based instructional package was done through Microsoft power point. 100 students were randomly selected from standard VIII of Smt. G.S. Mehta Municipal Girls High School, Jamnagar. These students were further divided into Experimental and Control groups. Two parallel tests were constructed by the investigator to study the achievement of the students. These two tests were constructed on the content topics simple present tense, present continuous tense, preposition- in, on, under and behind and possessive forms of has and have. Also, a five point reaction scale was constructed to study the reactions of the students on the developed package. Mean, SD, uncorrelated ‘t’ value and chi square were computed for data analysis. The developed IT based instructional package was found to be effective for teaching English Grammar because there was found a significant difference in the gain mean scores of the experimental group and control group. The students were found having positive reactions towards the developed IT based instruction.

23) Hüsamettin and Durmaz et.al (2006) conducted study On “Effects Of Computer Based Learning On Students’ Attitudes And Achievements Towards Analytical Chemistry”. The aim of this study was to compare the effects of computer-based learning and traditional method on students’ attitudes and achievement towards analytical chemistry. Students from Chemistry Education Department at Dokuz Eylul University (D.E.U) were selected randomly and divided into three groups; two experimental (Eg-1and Eg-2) and a control (Cg). In teaching analytical chemistry topics, two different computer based methods - new analytical
chemistry learning software called \textit{HEHAsit} (Method A) and a Microsoft Excel program (Method B)- were prepared by us and applied to Eg-1 and Eg-2, respectively. Whereas the last group (Cg) was taught by the traditional method (Method C). In the comparison of the effects of the three methods, we developed an attitude questionnaire and an achievement test related to Analytical chemistry, and applied to students in all three groups. Students’ attitudes towards computers were also tested by a computer attitude test developed by us.

\textit{Measures -Analytical Chemistry Attitudes Scale (ACAS)} is applied for measuring the interest and attitudes of students toward analytical chemistry. Each item in scale did not include more than one idea. ACAS included 25 positive and 25 negative questions. This scale was applied to 142 students. A descriptive analysis was conducted for each variable and correlation tests were performed among variables. After the evaluation, questions 1, 2, 35 and 38 were ignored because their correlation numbers were negative and/or near zero. Cronbach $\alpha$-reliability coefficient was 0.97 and validity coefficient was 0.95 after removing low-correlation questions for ACAS. Finally ACAS was used as a pretest and posttest.

\textit{Computer Attitudes Scale (CAS)} is applied for measuring the interest and attitudes of students to computer. Each item in scale was not included more than one idea. CAS was included 60 questions, 30 positive and 30 negative. This scale was applied to 142 students. Correlation test were used to analyze the data. After the evaluation, questions 1, 9, 14, 32, 38, 44 and 52 were canceled because their correlation numbers were negative and/or near zero. Cronbach $\alpha$-reliability coefficient was 0.93 and validity coefficient was 0.90 after removing low-correlation questions for CAS.
Analytical Chemistry Achievement Exam (ACAE): The purpose of this test was to measure the achievement of students. 9 questions included in the test. Three questions had long answers; six questions had short answers. One of the short answer questions was multiple-choice, one was true false, 4 questions were completing (filling in blank) test. As a result of the study, significant differences between control group and both experimental groups and between experimental groups on computer attitudes and analytical chemistry attitudes were found. Furthermore, analytical chemistry achievement in experimental groups was significantly higher from the control group.

The data were analyzed using SPSS statistics program. Paired samples t-test was used to investigate significant differences between pre- and post- test in the groups and one-way ANOVA was used to fix significant differences between groups. p values were considered in order to understand significant differences between groups and in the groups.

In this study, students’ attitudes toward analytical chemistry and achievement on analytical chemistry (acid-base titration) depending on computer-based learning, and traditional teaching methods compared. The computer program that used in computer-based method was presented on http://www.enderyilmaz.com. SPSS program was used to analyze the data. Although significant and positive changes were found on students’ attitudes toward analytical chemistry in method A and B, the results show no significant differences in Cg students’ attitudes toward analytical chemistry in traditional teaching method. These results show similarities with previous studies (Kulik & Kulik, 1991; Yates, 2000a, 2000b; Richard & Foust, 2001; Yalçınap, 1993). The results of analytical chemistry test presented students who were thought by method A and method B, were more successful than the students who were thought by
method C. Students’ interest and attention can easily attract with multimedia applications in computer. In addition, knowledge is not forgotten because number of using sense organs is increased in learning process. It can be concluded that computer based education is more effective than traditional methods on students’ attitude towards analytical chemistry. As a result of the study, significant differences between control group and both experimental groups and between experimental groups on computer attitudes and analytical chemistry attitudes were found. Furthermore, analytical chemistry achievement in experimental groups was significantly higher from the control group.

24) Vidal Puga (2006) conducted study on “Integration of ICT in the school context. Case study”. This research study aimed at to examine and to understand the impact of the introduction of ICT at a particular school. Here it is presented a case study that takes place in a Primary school where Information and Communication Technologies (ICT) are used in the teaching and learning processes. This study can serve as an example that contributes to understand organisational, professional and curricular factors, which influence the integration of these technologies in the school place. This is a mainly qualitative research what looks for a methodological triangulation by using different techniques and tools like observation, interviews, diary, questionnaires and documents’ analysis. The research conducted along the research process had various phases: the school election (and case study election), contacting the school (first meetings with the –female–director and presentation of the work plan to the teaching staff), first steps of the fieldwork (first collaborative negotiations, debate meetings with the selected teachers, data collection and data analysis), and elaboration and negotiation of the final Report. This process became a collaborative research, with the participation of
teachers in meetings and at various times during the data collection process. Constant feedback on the part of the researcher was present with several negotiations with the school. In this thesis summary are also presented, apart from the research problem, the process description, as well as the most relevant conclusions reached in this case study are: Among the most relevant conclusions derived from this research study are: The lack of time is a problem that worries teachers and impedes them to do things, also in relation to the ICT. This lack of time is a recurrent issue, which can clearly be detected when they recognise that they have not enough time to finish the subject themes at the end of the academic year, also due to the shortness in the length of each class time (some 50 minutes), which are even shortened with the process of classroom change and the breaks. This lack of time and the Jornada Única (school day length until lunch time, and not restarting teaching after lunch, as it happened in all Spanish schools until recent years) are also negatively seeing by teachers by making it difficult the coordination among themselves and augmenting thus the “celularismo” (o isolation, instead of collaboration/working in group). Some teachers point out that it is most necessary that someone coordinates the ICT use in each school, as to solve possible problems and liberating teachers to do these diverse tasks that are much time consuming. Talking about decisions related to timetable organisation, apart from the compulsory legal issues, the teachers’ interests are considered too, not individually but as a group, and bearing in mind the “weight” of each of their subjects. What is more, the aim of the studied school is rather to sum up, adding the ICT to what already exists, so with a non operative organisation of the teaching-learning process, which adds to the timetable and makes it an even more difficult task, full of contradictions. The search for controlling
students when they use computers in the computers’ room is a teacher’s objective for most teachers, so the distribution of the computers has a U shape. To this we can add: uniform timetables; silence in the classroom when working; the vertical communication directed by and to the teacher, who controls the “law and order” from his/her classroom platform, trying to firmly avoid that any student could surpass the norms. In general, there is a lack of clear definition of the use of the computers’ room, so many times students just use educational software (or play computers’ games) there, mostly of behavioural trial and error character, which tend to promote pure competitiveness among students. Current Developments in Technology-Assisted Education (2006). The distribution of computers in the classroom just depends on the teacher’s will, willing (or not) using them. There is a conception of the computer as a plus or extra element (which can be no necessary) and that it is of interest only for some. There is a total lack of integration of the ICT throughout a project that affects the whole school. In this school, the curriculum integration of computing is not defined and discrepancies exist which sometimes are contradictory in relation to what is officially written in the institutional documents, which are also contradictory. On the one hand, exists the idea that ICT implies an extra subject (computing or computers use), on the other hand, is seeing as a complement, ignoring what can be complemented or in which way, or towards which objectives. Changes, thus, are really scarce and they do not significantly affect the teaching-learning processes. The lack of training and knowledge on the part of teachers about ICT is a reality which puts barriers to its use on the part of the students. There are few teachers who teach at the computers’ room and they must teach all students. Therefore, the timetable for the computers’ room was made depending on the available time of said
ICT teachers. In this way, the integration of the ICT in the school was only seeing as a computer’ issue and not as a curricular issue which would benefit the whole school. The teachers’ attitude towards the ICT greatly influences its use. The lack of interest/rejection for the technologies is one of the greatest obstacles, together with the lack of training in ICT issues. The ejection derives sometimes of the lack of knowledge, which makes teachers to feel uncomfortable since students generally know more than themselves about computers and other technologies. Among teachers, the motivation to know and use ICT, sometimes derives from the interests and needs of their students. Many projects in the school did not succeed or end, or end badly, because of the lack of continuance of teachers in the school (because some posts are not still fixed ones, or because some do retire), what has a negative influence in their attitude towards the use of the ICT (too much work for such a short time or continuance at that particular school). Most computing teachers in the school were male, except in the case of a female teacher, so the use of ICT is markedly a masculine task, despite the fact that there are more female than male teachers. Some reasons: the priority the female teachers give to their family role, and their still lack of implication in pure sciences, more associated to men tradition. In fact, most (male) computers teachers teach the subject of Mathematics. However, in this school were women the ones with higher responsibility posts (headteacher and deputy teacher). So, in this school, all goes around the same “power group”, formed by men and women, young and not so young, who try to give the image of an active school (they have a school magazine, a school web page, etc.), although, actually, the lack of definition about the general implication of all in the whole school and its influence in the whole school too, did limited a real change. As to conclude, it is worth
saying that this research study utilised results and conclusions reached in a previous research study [8] about the introduction and use of computers and multimedia educational tools in Galician primary schools. Said research study was the first approximation to this reality, and gave some relevant conclusions/information to the research study presented here now. Some of those conclusions do coincide with the ones presented now. These are: still few teachers use ICT in the teaching-learning process; there is a real need for training teachers in ICT, not only from a technical, but also a pedagogical point of view. There is also a real need of a pedagogical analysis of these issues in each educational context in order to suggest teaching programmes which can be adequate to the interests and needs of teachers (a field which requires further research).

25) **Jagdish Rai (2006)** conducted study on “ICT for Curriculum Support and Teaching”. This paper presents an overview of the use of information and communications technology (ICT) in education, with a focus on the tools, framework architecture for designing curriculum and impact on teaching, curriculum and learning environment of ICT. The government’s current ICT policy in education is then explained, together with a review of the status in the implementation, regarding the four aspects of access and connectivity, teacher ennoblement, curriculum and support, and community-wide culture. Issues and concerns facing teachers and schools are addressed in this movement towards the integration of technology in education.

26) **Patil (2006)** conducted study on “Development of Multimedia Instructional System on Computer Education for B.Ed. Pupil Teachers”. The Study is based on a sound conceptual framework. The related literature has been reviewed comprehensively. All the seven objectives of the Study have been well enunciated as follows:
1. To analyze the conventional approach of teaching Computer Education.
2. To plan multimedia instructional system for Computer Education.
3. To design and construct multimedia instructional system for Computer Education.
4. To test the effectiveness of the constructed multimedia instructional system.
5. To compare the effectiveness of constructed multimedia instructional system with the conventional system of instruction.
6. To validate multimedia instructional system in terms of their effectiveness over conventional system of instruction.
7. To equip the pupil teachers and teacher-educators with reliable system to overcome the difficulties in theory course of Computer Education Instruction. All the research hypotheses and null hypotheses have been well formulated as follows: The Study has arrived at quite meaningful findings as follows: (1) The present setting of teaching of computer education in B.Ed. Colleges was found unsatisfactory. (2) It was found feasible to design, develop and implement a computer based Multimedia Instruction System for the Computer Education. (3) No significant difference was found between the performance of the pupil teachers of control and experimental group on pre-test. (4) Significant difference was found between the performance of the pupil teachers of control group and experimental group on post-test. (5) Significant difference was found between the performance of the pupil teachers of control group from pre-test to post-test. (6) There is significant difference between the performance of the pupil- teachers of experimental group from pre-test to post-test. (7) There is significant difference between the gains in achievement in terms of scores in pre-test and post-test of the pupil- teachers from pre to post test. (8) There is significant difference between the performance of the pupil-teachers from control and experimental groups in retention test. It is an interesting and appealing Study, which has very evidently
demonstrated its utility. However, the following questions can be addressed during further studies being carried out-. (1) What is the relative significance of the Standard Error of the difference between the two Means & Standard Error of the difference between the two Standard Deviations? (2) Should the focus of any investigator be central tendency or variability or both & why? (3) How do we differentiate a Prototype and fully functional Multimedia Instruction System? (4) What is the utility of Solomon Four Group Experimental Design in the context of the present study? (5) How gender has been considered as active variable in the context of the present study?

27) **Panchal (2006)** conducted study on “Development and Tryout of Self-Learning Materials in English subject on the unit of ‘Active and Passive Voice’ for the Students of Standard-XII” the present study aims (1) To compare the mean achievement scores of the students on simple tense on pretest and post-test. (2) To compare the mean achievement scores of the students on continuous tense on pre-test and post-test. (3) To compare the mean achievement scores of the students on perfect tense on pretest and post-test. (4) To compare the mean achievement scores of the students on simple modal auxiliaries on pre-test and post-test. (5) To compare the mean achievement scores of the students on perfect modal auxiliaries on pre-test and post-test. (6) To compare the mean achievement scores of the students on infinitive on pre-test and post-test. (7) To compare the mean achievement scores of the students on participle on pretest and post-test. (8) To compare the mean achievement scores of the students on causal construction on pre-test and post-test. (9) To compare the mean achievement scores of the students on imperative sentence on pre-test and post-test. (10) To compare the mean achievement scores of the students on active and passive voice on pre-test and post-test. (11)
To compare the mean gain scores of experimental and control groups on simple tense. (12) To compare the mean gain scores of experimental and control groups on continuous tense. (13) To compare the mean gain scores of experimental and control groups on perfect tense. (14) To compare the mean gain scores of experimental and control groups on simple modal auxiliaries. (15) To compare the mean gain scores of experimental and control groups on perfect modal auxiliaries. 

Tools Prepared: The Self-Learning Material on the topic of Active and Passive has been well developed. 

Research Design: Experimental Group Control Group pre-test post-test design, as well as, single group pretest post-test design have been suitably employed for the Study. Sample: A sample of 192 students has been drawn using compatible sampling techniques. Two pre-experimental groups were constituted, each having 32 students, one from Rural Area, whereas, the other one from Urban area, wherein, the sample units were duly distributed as Science Stream and General Stream, Boys and Girls. Similarly, one experimental group and one control group were constituted from urban area, whereas, another set of experimental and control groups was constituted from rural area, each having 32 students, distributed fairly stream-wise and gender-wise. 

Tools and techniques: Desai Verbal and Non-Verbal Group Intelligence Test, and the Sub-Criterion Tests, Main Criterion Test, and Opinionnaire constructed by the investigator were used for the Study. The characteristics of all the tools used for the study were well established. The data have been gathered systematically. Data analysis Correlated t-value, Independent t-value, ANOVA, ANCOVA, and Chi-square have been suitably used for data analysis. The Study has arrived at quite meaningful findings as follows: Students were found to have well understood Simple Tense, Continuous Tense, Perfect Tense, Simple Modal
Auxiliaries, Perfect Modal Auxiliaries, Infinitive, Participle, Causal Construction and Imperative Sentence through self learning material as evident through the pre-test and post-test status through mean achievement on respective sub-criterion tests. Students were found to have well understood Active and Passive Voice through self learning material. For both the schools of rural and urban areas, Learning through Self-Learning Material and Traditional Teaching was found almost equal on Simple Tense, Continuous Tense, Perfect Tense, Simple Modal Auxiliaries, Perfect Modal Auxiliaries and participle, as no significant difference has been reported on the mean gain scores. No significant difference was found in the mean scores on Learning on Infinitive through Self Learning Material in urban areas, whereas, it was found significant in rural areas. No significant difference was found in the mean scores on Learning on causal construction through Self Learning Material in rural areas , whereas, it was found significant in urban areas. Learning on Active and Passive Voice through Self Learning Material has been reported significantly greater in urban as well as rural areas as compared to that of control groups. There has been found a significant difference among the mean gain scores of students on Simple Tense taught through Self Learning Material in all the four selected schools. Similar has been found the status on Continuous Tense and Perfect Tense. No significant differences have been found among the mean gain scores of students on Simple Modal Auxiliaries, Perfect Modal Auxiliaries, Infinitive, Participle, Causal Construction and Imperative Sentence. No significant differences have found among the mean gain scores of students on Active and Passive Voice taught through Self Learning Materials in all the four schools. Students of the two selected schools have been found to gain significantly greater on Active and Passive Voice as evident through the retention test. The
Hypothesis that “There is no significant influence of gender, level of IQ and their interaction on achievement in Active and Passive Voice of the students learnt through Self-Learning Materials by considering pre-achievement in Active and Passive Voice as covariate” has been rejected at .05 level. The Self-Learning Material has been found to have greater impact on the students of General Stream than that of the Science Stream. The Self-Learning Material has been found to have greater impact on the students of urban area than that of the rural area. The Hypothesis that “There is no significant influence of level of IQ, stream and their interaction on achievement in Active and Passive Voice of the students learnt through Self-Learning Materials by considering pre-achievement in Active and Passive Voice as covariate” has been rejected at .05 level. The Hypothesis that “There is no significant influence of level of IQ, area and their interaction on achievement in Active and Passive Voice of the students learnt through Self-Learning Materials by considering pre-achievement in Active and Passive Voice as covariate” has been rejected at .05 level. The self-learning material has been found to have better impact on the students of General Stream than that of the Science Stream. It has been found to have better impact on the students of urban area than that of the rural area. Gender, level of IQ and the interaction between the gender and level of IQ have been found to have no significant effect on the mean achievement of the students on Active and Passive Voice learnt through Self-Learning Materials. The self-learning material has been found to have a better impact on boys than
girls. It has been found to have a better impact on the students of general stream than that of science stream. There has been found a significant interaction effect of the gender and stream on the mean scores on main criterion test at post-test stages. The self-learning material has been found to have a better impact on the students of urban area than that of the rural area. The self-learning material has been found to have a better impact on the students of average level than that of higher level. There has been found a significant effect of the interaction of level of IQ and area on the mean scores on main criterion test at post-test stages. There has been found a significant effect of the interaction of stream and area on the mean scores on main criterion test at post-test stages. The students have been found to have favourable opinion on the self-learning material.

28) **Jayaraman, (2006)** conducted study on “A Study of the Relative Effectiveness of Computer Based Multimedia Learning Packages on Performance and Behavioural Outcomes of Students of Different Age Groups”. The purpose this is (1) To identify hard topics, perceived by the teachers and students of class V, VIII and XI for developing Packages. (2) To develop three multimedia packages separately each for a) Class V on the lesson “Vazhvatharkaka”. b) Class VIII on the lesson “Mechanics”. c) Class XI on the part of lesson “Kinematics”. (3) To study the relative effectiveness of the CBMMLP in facilitating the learning of various concepts in hard topics. (4) To study and compare the gain percentage of different age groups of Students. (5) To study the relative performance and the behaviour of the different age groups of students. **Research Methodology:** (1) Identification of the hard subjects for class 5,8 and 11. (2) Selection of concepts for developing Computer Based Multi Media Learning Package (CBMMLP). (3) Developing the CBMMLP. (4) Alpha Testing of CBMMLP. (5) Field tryout of
CBMMLP. (6) Validation of the CBMMLP. (7) Analysis of the data collected. (8) Interpretation and arriving at thesis and recommendations. **Research Design:** The researcher has suitably employed Quasi-Experimental design using pre-test and post-test for experimental group and post-test for the control group. A demographic survey has also been used to assess the characteristics of the subjects and the comparability of the groups. **Sample for the Study:** The samples have been drawn employing compatible sampling technique. The samples have been drawn from Std. V, Std. VIII & Std. XI. Class V students have been selected for being most visually preferred, whereas, class VIII & class XI students have been selected for having auditory preference. The experimental groups are constituted of 104 students (V-31, VIII-37 & XI-36), whereas, control groups are constituted of 92 students (V-31, VIII-31 & XI-30). **Variables of the Study:** The independent variables in this study are the three CBMMLP, whereas, the dependent variable Learning Outcomes in terms of learners’ performance in recall and application in specific content area facts, concepts, principles and procedures. Learners’ attitude (dependent variable) has been measured through the comparative satisfaction towards the CBMMLP. **Tools Employed:** Various tools, namely, Pre and Post Achievement Tests, Three different Survey Instruments to identify the Hard topics, Students’ Characteristics Measure, Satisfaction Survey each one for all grades and Inventory Tool to find out the attitude towards computers have been well constructed. The characteristics of all the tools have been thoroughly established. **Data Analysis Technique Used:** One way ANOVA has been appropriately employed for data analysis. Reconciliation techniques have also been used for data analysis. **Findings of the Study:** (1) The CBMMLP prepared specifically for the particular concepts are significantly effective for
all the age groups of students. There has been found a higher usage by higher age group students. (2) The relative effectiveness of the CBMMLP is significant for all the age groups of students who are studying class V, class VIII and class XI. The performance of the students who have learnt through CBMMLP is higher than the performance of the students who have not learnt through CBMMLP. (3) The analysis of the effect size reveals that it varies between class V, class VIII, and class XI, which is, 4.20, 2.83 and 4.72 respectively. These effect sizes are considered as large and educationally significant. (4) Higher age group students have been found to have more positive attitude towards CBMMLP than the lower age group students. (5) The higher age group students have been found more auditory preferred than the lower age group students, whereas, the lower age group students have been found more visually preferred.

29) **Mlambo (2007)** conducted study on “Information and Communication Technology in A-Level Physics teaching and learning at secondary schools in Manicaland Zimbabwe: Multiple case studies”. It was the aim of this study to determine the extent to which Physics teachers and students used ICT in their usual teaching/learning ambience, referred to as natural settings in this study. Using activity theory as a theoretical lens, multiple case studies were chosen as a strategy using 10 schools, 15 Physics teachers, 20 A-level Physics students and 10 ICT teachers (computer specialists). The sampling frame was the population of all A-Level schools that offer A-Level Physics in Manicaland. The following non-probability sampling procedure guidelines were applied to select the participating schools. The sampling procedure was purposive (Charles & Mertler, 2002) because these schools had to be A-Level, offering Physics in the curriculum and known to have computers, although the exact number of computers was not
important. The procedure also included quota sampling (Charles & Mertler, 2002) because the sample had to be representative of groups A, B and C schools - typical historical school groupings in Zimbabwe. Convenience sampling (Charles & Mertler 2002) was employed because the majority of the schools had to be easily reachable. Questionnaires, observations and informal and focus group interviews were used to elicit responses from students, teachers and computer specialists. The data analysis tools were limited to pen and notebook in the field and a word processor and a spreadsheet program back in the office. Write-ups of notes made in the field were done immediately to take advantage of stimulated recall on reading the notes. Initial discovery memos as well as additional thoughts memos were written during visits both in the field and during the data analysis process. Content analysis was done based on the questionnaire and observation notes and interviews. It emerged from the case studies that despite the presence of apt ICT infrastructure in the schools and although the teachers had a positive attitude towards the use of ICT for teaching and learning of Physics, teachers were apathetic when it came to the actual use. Some of the reasons militating against use were lack of an ICT policy, school authority, and monopoly of computers enjoyed by computer studies teachers. However among students there were ‘early starters’ who used ICTs outside of school, a situation that tended to change the Physics learning environment. These findings led to a proposal for a post of Computer Specialist (CS) in the schools. The need for developing ICT policy at all levels namely national, Ministry of Education and the school was also proposed. Lastly staff development in the use ICT for Physics teachers was proposed as indispensable.

30) **Chen (2007)** conducted study on “Issues Relating to Information and Communication Technology in Middle Schools in northern
China with specific reference to two cities”. The use of information and communications technology (ICT) in schools has become widespread in many countries throughout the world. The extent to which it has been incorporated into the work of schools varies widely from simply as a tool to help produce documents to one that is fully integrated into the whole school curriculum. Initiatives taken to encourage teachers to use ICT in their teaching and learning methodologies inevitably raise awareness of pedagogical issues and how these should be reappraised in the light of the demands of encompassing the new technology. China started the process of introducing ICT into its schools later than many other countries. This study examines the use of ICT in middle schools in cities in north east China to discover the attitudes of teachers and students to how effective the use of ICT is from their viewpoints. In addition the study ascertains the possibilities for further development of the use of ICT to enrich the students’ education. Where possible the interpretation of the analyses of the findings are generalised further from the two cities in which the survey took place.

31) Boyraz (2008) conducted study on “The Effects Of Computer Based Instruction On Seventh Grade Students’ Spatial Ability, Attitudes Toward Geometry, Mathematics And Technology”. The aims of this study were to investigate the effects of two different methods of dynamic geometry based computer instruction on seventh grade students’ attitudes towards geometry, attitudes toward mathematic and technology and spatial abilities compared to traditional textbook based instruction and to get the students’ views related to the effects of computer based instruction on their learning. The sample consisted of 57 seventh grade students from a private elementary school in Kayseri. The study was conducted in the 2006-2007 academic year, lasting 14 lesson hours (two
weeks). The data were collected through spatial ability test, mathematics and technology attitude scale, geometry attitude scale, and interviews. As descriptive statistics, means and standard deviations were used to investigate the general characteristics of the sample. The data gathered through the spatial ability test, mathematics and technology attitudes scale, and geometry attitude scale were analyzed by using Statistical Package for Social Sciences (SPSS) 15.0. Multivariate analyses of covariance (MANCOVA) procedure was employed to answer the research problems. As the MANCOVA results only show significant differences between groups on the collective dependent variables, follow-up analyses of variance (ANCOVAs) were used to look at the effects of method of teaching on each dependent variable. The results revealed that two different methods of dynamic geometry based computer instruction didn’t have a significant effect on students’ spatial abilities compared to traditional textbook based instruction. The results also indicated that two different methods of dynamic geometry based instruction had a significant effect on students’ attitudes toward geometry, mathematics and technology compared to traditional textbook based instruction. The results of the interviews indicated that computers created a dynamic learning environment which supported students’ development and computers also helped students to explore mathematic in a far more meaningful way.

32) Ilomäki (2008) conducted study on “The effects of ICT on school: teachers’ and students’ perspectives”. The purpose of this study was to investigate the effects of information and communication technology (ICT) on school from teachers’ and students’ perspectives. The focus was on three main subject matters: on ICT use and competence, on teacher and school community, and on learning environment and teaching practices. The study is
closely connected to the national educational policy which has aimed strongly at supporting the implementation of ICT in pedagogical practices at all institutional levels. The phenomena were investigated using a mixed methods approach. The qualitative data from three cases studies and the quantitative data from three statistical studies were combined. In this study, mixed methods were used to investigate the complex phenomena from various stakeholders’ points of view, and to support validation by combining different perspectives in order to give a fuller and more complete picture of the phenomena. The data were used in a complementary manner. The results indicate that the technical resources for using ICT both at school and at homes are very good. In general, students are capable and motivated users of new technology; these skills and attitudes are mainly based on home resources and leisure time use. Students have the skills to use new kinds of applications and new forms of technology, and their ICT skills are wide, although not necessarily adequate; the working habits might be ineffective and even wrong. Some students have a special kind of ICT-related adaptive expertise which develops in a beneficial interaction between school guidance and challenges, and individual interest and activity. Teachers’ skills are more heterogeneous. The large majority of teachers have sufficient skills for everyday and routine working practices, but many of them still have difficulties in finding a meaningful pedagogical use for technology. The intensive case study indicated that for the majority of teachers the intensive ICT projects offer a possibility for learning new skills and competences intertwined in the work, often also supported by external experts and a collaborative teacher community; a possibility that “ordinary” teachers usually do not have. Further, teachers’ good ICT competence help them to adopt new pedagogical practices and integrate ICT in a meaningful way.
The genders differ in their use of and skills in ICT: males show better skills especially in purely technical issues also in schools and classrooms, whereas female students and younger female teachers use ICT in their ordinary practices quite naturally. With time, the technology has become less technical and its communication and creation affordances have become stronger, easier to use, more popular and motivating, all of which has increased female interest in the technology. There is a generation gap in ICT use and competence between teachers and students. This is apparent especially in the ICT-related pedagogical practices in the majority of schools. The new digital affordances not only replace some previous practices; the new functionalities change many of our existing conceptions, values, attitudes and practices. The very different conceptions that generations have about technology leads, in the worst case, to a digital gap in education; the technology used in school is boring and ineffective compared to the ICT use outside school, and it does not provide the competence needed for using advanced technology in learning. The results indicate that in schools which have special ICT projects (“ICT pilot schools”) for improving pedagogy, these have led to true changes in teaching practices. Many teachers adopted student-centred and collaborative, inquiry-oriented teaching practices as well as practices that supported students’ authentic activities, independent work, knowledge building, and students’ responsibility. This is, indeed, strongly dependent on the ICT-related pedagogical competence of the teacher. However, the daily practices of some teachers still reflected a rather traditional teacher-centred approach. As a matter of fact, very few teachers ever represented solely, e.g. the knowledge building approach; teachers used various approaches or mixed them, based on the situation, teaching and learning goals, and on their pedagogical
and technical competence. In general, changes towards pedagogical improvements even in well organised developmental projects are slow. As a result, there are two kinds of ICT stories: successful “ICT pilot schools” with pedagogical innovations related to ICT and with school community level agreement about the visions and aims, and “ordinary schools”, which have no particular interest in or external support for using ICT for improvement, and in which ICT is used in a more routine way, and as a tool for individual teachers, not for the school community.

33) Yuen and Lee et al., (2008) conducted study on “Factors Predicting Impact of ICT-Use on Students: An Exploration of Teachers’ Perceptions”. The present paper focused on the exploration of the factors associated with the impact of ICT-use on students’ 21st-century skills as perceived by teachers, in which students’ 21st-century skills included information-handling skills, problem-solving skills, self-directed learning skills, collaborative skills, communication skills, ICT skills, and ability to learn at students’ own pace. In order to predict and understand teachers’ perceptions of the impact of ICT-use on students’ 21st-century skills, we proposed a model embracing five factors: (1) teachers’ perceptions on teacher-practice orientation 21st-century learning, (2) student-practice orientation of 21st-century learning, (3) pedagogical ICT competence, (4) teachers’ perceptions on the presence of a community of practice on professional collaboration, and (5) teacher-related obstacles in using ICT. Results of the path analysis revealed three direct effects on student-impact, namely teacher-practice orientation, student-practice orientation, and pedagogical ICT competence. Findings revealed that teacher perception on student-practice orientation was the strongest predictor of student-impact than other factors. The direct effects of teacher-practice orientation, student-practice orientation, and
pedagogical ICT competence on student-impact were positive. The pedagogical ICT competence had direct as well as indirect effects on student-impact. However, the effects of pedagogical ICT competence on the mediated factors teacher-practice orientation and student-practice orientation were negative. The indirect effects of community of practice on professional collaboration and teacher-related obstacles in using ICT on student-impact were mediated through teacher-practice orientation, student-practice orientation, or pedagogical ICT competence. The effects of community of practice on professional collaboration on all mediated factors were positive whereas the effects of teacher-related obstacles in using ICT on all mediated factors were negative. Finally, implications for teacher professional development are discussed.

34) **Ngogo (2008)** conducted study on “Design of ICT procurement process model for secondary schools in Tanzania”. This study aims at the Information and Communication Technologies (ICT) Procurement Process as an important part for schools organizations in developing countries, as after this level of education, students can either continue with studies in higher education or start working. Both cases require people to be literate users of ICTs. The procurement of new technologies, need to target specific processes that fit to local contexts in regards to existing level of available equipment and infrastructures. Literature review on procurement processes in the context of Tanzania indicates the use of centralized and decentralized ICT procurement processes. Through centralization the government has completed procurement of ICT equipment and networked 32 Teachers colleges and started training Teachers who will be future trainers in secondary schools. This will be followed by centralized procurement of ICT equipments for secondary schools, depending
on availability of funds. On decentralizations the government has prepared a procurement guideline for secondary education development plan (PGSEDP), for use in individual schools when procuring works, goods and services. Analysis of ICT Procurement in Secondary Schools in Dar Es Salaam, indicates less awareness on the availability of procurement guideline and dependence on using second hand technologies, as new equipments are expensive for schools to afford. Lack of maturity in schools communities on using e-mails in order to source out suppliers of ICT equipments has resulted schools to depend on the supply from different organizations which are established locally. Historical perspective of ICT Procurement in Tanzania indicates that, there was a ban on ICT Importation into the country for 20 years 1974-1994. It is from this context, the author explores the design of an ICT Procurement Process aiming on improving access of ICT equipment for training in Secondary Schools. The focus has been on awareness use of e-mail for internal and external communications in order to increase access to already made ICT technologies. Review on the value of a more network of people in communication indicates that, its value is proportional to the square of number of communicating nodes. Results will be used by educational administrators when making decision on what ICT is appropriate to procure for secondary schools in Tanzania.

35) **Hancer (2008)** conducted study on “A Research on the Effects of Computer Assisted Science Teaching”. This study aims to prove the effectiveness of computer assisted teaching method over the teacher centered method (explaining, question-answer, demonstration) together with the academic achievement of science teaching students in the fields of science and technology. In this study, pretest-final test control grouped model was used and 3rd class students of science Teaching department, Education Faculty
at Cumhuriyet University in Sivas, in the term fall, 2006-2007 academic year, were involved in it. Both control groups (n=24) and experiments group (n=23) had the same features in terms of being students and totally 47 students participated in our study. The research has lasted for twelve weeks with the pre test, final test and permanent test application periods for both groups. After t-test analysis, data showed that computer assisted teaching was more effective than teacher-centered methods to increase academic achievement and to acquire permanent teaching.

36) **Peterson Robinson and J. Samuel (2009)** conducted study on “ICT Integration In Enhancing English Language Teaching And Learning”. This study was undertaken with the purpose to unfold and understand the need for integration of ICT tools in the teaching and learning of English Language in Malaysian schools in particular oral communication skills. The study further examines the benefits of integrating ICT tools, the success factors and obstacles encountered by English Language option teachers in ICT integration. This study used a multiple-case design approach, involving mixed methods i.e. qualitative and quantitative approaches. Teachers from nine areas in West Malaysia were involved in the study. A cross sectional questionnaire survey was used to find out the level and extent of ICT integration carried out by English option teachers. Open-ended questions in the last part of the survey were used to find out the reasons for the poor oral communication skills of the students. Teacher and pupil interviews that were transcribed and carefully coded together with teacher observations were analyzed to find out in detail the factors that were withholding the students from verbalizing their thoughts in simple English. User requirements obtained from the research findings were subsequently used in the creation of the Virtual English Language Tool (VELT). The end objective of this tool is to
improve the English language proficiency of students in particular their oral communication skills. VELT incorporates a series of interactive lessons customized to local themes, topics and language variations. The VELT modules cater for the development of different communication skills namely pronunciation, stress, rhythm and intonation, basic conversational English with appropriate structure, word order and appropriate semantic elements. VELT was implemented among 29 Year 5 pupils in Banting District in Selangor for a period of 9 months in 2005. Further implementation and evaluation of the tool were carried out in two other schools in 2007, namely in Ampang District and in Kuchai Lama District in Selangor. The evaluation findings on the usefulness of VELT among students in the above mentioned three case studies showed that ICT integrated lessons and the online tutorial using Instant Messaging tools not only improved their oral communication skills but further increased their attainment levels in terms of academic achievement and classroom participation. Another pertinent finding in the case studies revealed that the free audio and video conferencing tools embedded in Instant Messaging tools could be exploited by English Language teachers to enhance students’ communication skills. Besides the practical contribution of VELT, the study has developed an empirical-based framework on ICT integration which could act as a training model for pre-service and in-service English option teachers on ways of enhancing English Language teaching and learning in particular oral communication skills. This framework could further be used to serve as a general guideline for other subject areas. Despite its success in achieving its objectives, this study is subjected to several limitations that include an online progress report, incorporating audio and video conferencing tools within VELT and giving more sophistication to the VELT designs and graphic user
interface elements. Future research should consider investigating cross-cultural variables so that usage of VELT as a teaching-learning tool could be extended to other countries which face similar problems.

37) Cavas et al., (2009) conducted study On “A Study On Science Teachers' Attitudes Toward Information And Communication Technologies In Education”. The purpose of this study was to reveal Turkish primary science teachers’ attitudes toward ICT in education and then explore the relationship between teachers’ attitudes and factors which are related to teachers’ personal characteristics (gender, age, computer ownership at home, and computer experience). The target population for this study was Turkish science teachers enrolled in primary schools during the school year 2004-2005. Stratified sampling was used to obtain data from 1071 science teachers of primary. Three cities from each of seven geographic region of Turkey were selected with three levels (high, medium, low) of socio economic status reported by Turkish State Planning Organization. In order to collect data, an instrument (STATICTE) was developed by researchers and administered to 1071 science teachers almost uniformly distributed in 7 geographic regions of Turkey. In data analyses, descriptive statistics were used to describe and summarize the properties of the mass of data collected from the respondents. The findings of the study revealed no significant differences between ICT attitudes of Turkish science teachers in terms of gender. This would suggest that male and female science teachers in Turkey have the same perception about the use of ICT in education. The results also indicate that Turkish science teachers have positive attitudes toward ICT and although teachers’ attitudes toward ICT do not differ regarding gender, it differs regarding age, computer ownership at home and computer experience. The results of the
study showed that almost half of the Turkish science teachers use computers in their courses and they had high levels of computer access, especially in their school and at their homes. It is hoped that the outcomes of this study can be used in shaping innovational practices in the Turkish Educational System.

38) **Naba'h et al., (2009)** conducted study on “The Effect of Computer Assisted Language Learning in Teaching English Grammar on the Achievement of Secondary Students in Jordan”. This study aimed at investigating the effect of using an instructional software program of English language on the achievement of secondary students in Jordan. The sample of the study consisted of (212) students distributed randomly on four experimental groups and four control groups. Four public schools were purposefully chosen from the Educational Directorate in Zarqa for convenience. In addition, the schools were equipped with computer labs. Consequently, students are supposed to have previous experience in using software. The instruments of the study were an instructional software program for teaching the passive voice and an achievement test. An Analysis of covariance was used to find out the effect of the instructional program on the students’ achievement in the passive voice. The findings of the study revealed that: 1. there were statistically significant differences ($\alpha < 0.05$) between the students’ achievement mean scores in grammar attributed to the instructional method of teaching. This difference is in favor of the students in the experimental group 2. there were statistically significant differences ($\alpha < 0.05$) between the students’ achievement mean scores in grammar attributed to gender. This difference is in favor of male students. 3. there were statistically significant differences ($\alpha < 0.05$) between the students’ achievement mean scores in grammar attributed to stream of study. This difference is in favor of the scientific stream students.
In light of the findings of the study, it was recommended that TEFL teachers use CAI lessons in their instruction.

39) **King Luu (2009)** conducted study on “An Analysis Of The Relationship Between Information And Communication Technology (Ict) And Scientific Literacy In Canada And Australia”. This investment has been largely predicated on the hypothesized relationship between ICT and science achievement, and the need for ICT as a means of providing broad-scale training to meet the demand for a skilled workforce. To better understand this possible relationship, this study used data from the 2006 administration of the Programme for International Student Assessment (PISA 2006) to determine the extent to which scientific literacy is predicted by student- and school-level variables related to ICT, after adjusting for student demographic characteristics and school characteristics. The findings suggest that, once student demographic characteristics and school characteristics have been accounted for, students with prior experience with ICT, who browse the Internet more frequently, and who are confident with basic ICT tasks earned higher scientific literacy scores. Gender differences existed with respect to types of productivity and entertainment software used; this difference may be attributed to personal choice and initiative to learn ICT. Finally, differences in ICT use between Canada and Australia, particularly with school use, may be due to initiatives in Australia (e.g., *National Goals of Schooling for the Twenty-first Century*) that promote the increased use of ICT in classrooms.

40) **Açikalin (2010)**, conducted study on “Exemplary Social Studies Teachers Use Of Computer-Supported Instruction In The Classroom”. Educators increasingly support the use of computer-supported instruction in social studies education. However, few studies have been conducted to study teacher use of computer-
supported instruction in social studies education. This study was therefore designed to examine the use of exemplary social studies teachers’ computer supported instruction in the classroom. Case study methodological approach was used for this study. Four exemplary social studies teachers who use computer-supported instruction in their teaching practices were selected as participants. The data were collected from interviews and classroom observations. The data analysis indicated that all of the participants agreed that the computer is a powerful research tool which facilitates students’ work and makes the work faster and easier for the students. The participants used various types of computer-supported instruction in their classrooms. The use of the Internet and software programs such as Microsoft Power Point, Word, and Excel were the most common use of computer-supported instruction in the classrooms observed. There are few studies on the effectiveness of computer-supported writing activities in social studies. Therefore, it is clear that there is a need for more empirical research to investigate the role of Microsoft Word in preparing student projects in the social studies classroom.

41) **Youssef and Dahmani (2010)**, conducted study on “The Impact Of ICT's On Students’ Performance In Higher Education: Direct Effects, Indirect Effects And Organizational Change”. The purpose of the present paper is to examine the relationship between the use of Information and Communication Technologies (ICT) and students’ performance in Higher Education. Earlier economic research has failed to provide a clear consensus on the effect of ICTs' investments on student's achievement. Our paper aims at summarizing the main findings of the literature and to give two complementary explanations. The first one focuses on the indirect effects of ICT on standard explanatory factors. Since student’s performance is mainly explained by student’s characteristics,
educational environment and teachers characteristics, ICT may impact those determinants and consequently the outcome of education. The differences observed in students’ performances are thus more related to the differentiated impact of ICT on standard explanatory factors. The second thesis advocates that ICT uses need a change in the organization of the Higher Education. While ICT equipment and uses rates are growing very fast in the European Union, the adoption of complementary organizational designs is very slow and differs from one institution to another. This may explain the observed differences in student’s achievement.

42) Yusuf (2010) conducted study on “Effects Of Computer Assisted Instruction (Cai) On Secondary School Students’ performance In Biology”. This study 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. This paradigm represents three levels of treatment: the individualized Computer Assisted Instruction (experimental group 1), Cooperative Computer Assisted Instruction (experimental group 2) and the Conventional Instruction (control group); and two levels of gender (Male and female). 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 instruments for this research were the treatment instrument “Computer Assisted Instructional Package (CAIP)” and the test instrument, “Biology Performance Test (BIOPET)”. The treatment instrument, Computer Assisted Instructional Package (CAIP) on Biology, was a self-instructional, interactive package that lasted for 21/2 hour for an
average student. All the groups (experimental and control groups) were subjected to the BIOPET as pre-test. Then, the students in the first experimental (individualised) group were exposed to CAIP which had been installed on desktop computers using a web browser (Explorer or Firefox), while the second experimental group were exposed to the same content with four students working on a desktop computers. Other applications such as Internet access, CAI packages, games, and so on were disabled or removed. The students in the experimental groups were introduced to the CAI format under teacher’s supervision long enough for them to be familiar with the navigation buttons and use the package independently. In addition, they were encouraged to take enough notes that could be useful for them in the post test. The control group students were exposed to the conventional teaching method on the same content used for experimental groups. They were taught using conventional classroom format. The classroom contained a chalkboard, overhead projector, and charts which were used for the instruction. The treatment for all the groups lasted for five weeks. After the treatment the three groups were exposed to the BIOPET which had been rearranged as post test. The students’ pre-test and post test scores were subjected to Analysis of Covariance (ANCOVA). The result of the analysis of covariance on the performance of students taught biology using computer assisted instructional packages in cooperative and individualised learning settings and those taught with conventional classroom instruction indicated a significant difference in favour of the students in the experimental groups. This indicated 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.

43) Oğuz Serin (2011) conducted study on “The Effects Of The Computer-Based Instruction On The Achievement And Problem Solving Skills Of The Science And Technology Students”. This study aims to investigate the effects of the computer-based instruction on the achievements and problem solving skills of the science and technology students. This is a study based on the pre-test/post-test control group design. The participants of the study consist of 52 students; 26 in the experimental group, 26 in the control group. The achievements test on “the world, the sun and the moon” and the Problem Solving Inventory for children were used to collect data. The experimental group received the computer-based science and technology instruction three hours a week during three weeks. In the analyses of data, the independent groups t-test was used at the outset of the study to find out the whether the levels of the two groups were equivalent in terms of their achievements and problem solving skills and the Kolmogorov-Smirnov single sample test to find out whether the data follow a normal distribution and finally, the covariance analysis (ANCOVA) to evaluate the efficacy of the experimental process. The result of the study reveals that there is a statistically significant increase in the achievements and problem solving skills of the students in the experimental group that received the computer based science and technology instruction.

44) Gorghiu and Gorghiu et al., (2011) conducted study on “Remarks on pupils’ feedback concerning the implementation of virtual experiments in Science teaching”. The paper presents some conclusion results from the feedback expressed by over 2800
pupils from five countries, concerning the use of new virtual experiments designed by 146 teachers who participated to the training modules “Virtual Instrumentation in Science Education” organized in the frame of Socrates-Comenius 2.1. European project “VccSSe - Virtual Community Collaborating Space for Science Education”. Different aspects and interpretation related to the challenges and difficulties encountered during the implementation process are also included. The results have proved that the use of virtual instruments can produce benefic changes concerning the social dynamics of the classrooms. The information - presented in a new way - has a great influence on development of an authentic learning.

45) **Barger and Byrd (2011)** conducted study on “Motivation and Computer-Based Instructional Design”. The purpose of the current research discussion is to better inform how computer-based instructional design can be used as a motivational strategy. The approach of this particular research discussion is to use humanistic theory (holistic focus on student needs) to inform teachers’ instructional and motivational design process. Research on computer-based instructional design informed by motivational theory provides a conceptual framework for teachers to use in combining motivational concepts with their instructional design strategy. With respect to computer-based instructional design, the use of computers outside of the classroom (for personal and recreational purposes) forms the basis of motivating students to learn using computers within the classroom. This implies that teachers benefit when engaging students in academic materials using computers. Therefore it is necessary for instructors to implement options and opportunities for the self paced learner to engage in that will increase interest.
46) **Delen and Bulut (2011)**, conducted study on *The Relationship Between Students’ Exposure To Technology And Their Achievement In Science And Math.*. The purpose of this study was to examine the effects of information and communication technologies (ICT) on students’ math and science achievement. Recently, ICT has been widely used in classrooms for teaching and learning purposes. Therefore, it is important to investigate how these technological developments affect students’ performance at school. The data for this study comes from the 2009 administration of The Programme for International Student Assessment (PISA), an internationally standardized assessment administered to 15-year-old students (9th grades) in schools. The sample includes 4996 students in Turkey. Hierarchical linear modeling was used for analyzing the effects of ICT in student and school levels by using ICT-related variables such as technology scores and ICT availability at home, etc. The results indicated that students’ familiarity with ICT and their exposure to technology helped to explain math and science achievement gaps between individuals and schools. ICT is an important factor that should be taken into consideration when designing classroom environments.

47) **Nwana (2012)** conducted study on “*Challenges In The Application Of E-Learning By Secondary School Teachers In Anambra State, Nigeria*”. This is an empirical research study which investigated the challenges in the application of e-learning in secondary schools in Onitsha North LGA, Anambra State, Nigeria. Two hundred and twenty-five (225) teachers in public secondary schools were used as the sample for the study. A self-developed instrument (TIUELM) on the availability and use of e-learning materials was used for data collection. The instrument contained 25 items. The reliability co-efficient of the instrument stood at 0.88. The data collected were analyzed using frequency distribution and mean. The
findings revealed: acute shortage of e-learning materials such as on-line/internet-connected computers, e-mail facilities, multimedia television, multimedia computer and digital library. It was also revealed that the few available ones such as off-line/ordinary computers, scanner, printer and ready-made courseware are not utilized because the teachers lack the knowledge and skills of computer application. The only material identified as available and in use is the telephone. It was recommended among other things that, the government should embark on a massive computer training program for teachers. Teachers should be trained and retrained through in-service training, seminars, workshops and conferences for acquisition of the knowledge and skills needed for e-learning application in secondary schools in Nigeria.

48) Kazi Enamul Hoque and Ahmad Zabidi Abdul Razak et al., (2012) conducted study on “ICT Utilization among School Teachers and Principals in Malaysia” The purpose of this research was to find the areas of ICT utilization among teachers and principals of Malaysian schools. Quantitative method was used in this study with a representative sample of 260 school teachers, teachers-supervisors and principals. The finding of the research demonstrates that 84% of the teachers are not aware of national ICT policy though it exists. Finding shows that most of the schools (80%) do not have ICT policy at the school level though the facilities and equipment of ICT are available in most Malaysian schools. Almost all the teachers have a high level of skills in using computer and profoundly the basic skills needed for teachers in IT are attained by all the teachers. Likewise, 95% schools have photocopy machines and scanners while the multimedia projector is available in 85% schools. Besides, 72% schools are equipped with a video camera, overhead projector and laptop. However, it is
interesting that their expertise and skills are not integrated with educational management or with teaching/classroom purposes. Rather they are used for daily administrative purposes. The findings of the study will benefit the policy makers of developing countries, Principals, teachers and other education related personalities of Malaysia and likewise.

49) **Niraj Kumar Roy (2012)** conducted study on “ICT –Enabled Rural Education in India”. Right to Education is the primary right of every citizen of India, whether a child resides in a high profile society or in a far away not so developed secluded village, according to the Article 45 of Indian Constitution the basic elementary education must be provided to all the children up to the age of fourteen years. Even after 64 years of independence some States in India are still struggling to achieve Universal enrolment, retention and quality education. There are about 1303996 or more than one million rural schools among 6,38,000 villages in India. Schools in rural areas are promoted to raise the level of education and literacy in rural India. The main aim of running these types of schools in India is to increase the rate of literacy in rural areas. More than 40 percent of India’s population is illiterate and cannot read or write. Schools in rural areas are inadequate and often equivalent to being non-existent. Thus, government’s initiative to set up schools in rural areas came into picture. According to Just Indian Schools the conditions of rural education in India, is improving steadily and the government is also providing full support and providing with many initiatives. The fee structure in these schools is also very low so that every child can study and afford it.

50) **Aleksander Aristovnik (2012)** conducted study on “The Impact Of ICT On Educational Performance And Its Efficiency In Selected EU And OECD Countries: A Non-Parametric Analysis” The purpose
of the paper is to review some previous researches examining ICT efficiency and the impact of ICT on educational output/outcome as well as different conceptual and methodological issues related to performance measurement. Moreover, a definition, measurements and the empirical application of a model measuring the efficiency of ICT use and its impact at national levels will be considered. For this purpose, the Data Envelopment Analysis (DEA) technique is presented and then applied to selected EU-27 and OECD countries. The empirical results show that the efficiency of ICT, when taking educational outputs/outcomes into consideration, differs significantly across the great majority of EU and OECD countries. The analysis of the varying levels of (output-oriented) efficiency (under the VRSTE framework) shows that Finland, Norway, Belgium and Korea are the most efficient countries in terms of their ICT sectors. Finally, the analysis finds evidence that most of the countries under consideration hold great potential for increased efficiency in ICT and for improving their educational outputs and outcomes.

51) Margaret Robertson and Abdulrahman Al-Zahrani (2012) conducted study on “Self-efficacy and ICT integration into initial teacher education in Saudi Arabia: Matching policy with practice”. Out This study discussed factors for integration of ICTs in higher education teaching and learning reveal a complex mixture of old and new paradigms. A review of the relevant literature and findings from research conducted in Saudi Arabia highlights the importance of actual and perceived self-efficacy within the new paradigms. The research reported reflects these perceptual dilemmas. Participants were 325 Saudi pre-service teachers from the Faculty of Education at King Abdulaziz University. Findings reveal that participants have generally high skill levels with computing tasks and their perceptions of self-efficacy as university
teachers increase with computer experience and computer qualifications. These findings imply that increasing Saudi pre-service teacher access, training, and exposure to computers and ICTs will contribute effectively to boosting their self-efficacy, motivation, and computing habits. However, where traditional views of teacher directed learning remain unchallenged change is conservative and context specific. To overcome the perceptual gap, data underline the importance of sympathetic and strategic leadership, effective curriculum design and innovative pedagogies to sustain outcomes.

52) **Sandhya Khedekar and Sunita Magre (2012)**, conducted study on A Study Of Information And Communication Technology Awareness And Academic Performance Of Secondary Students. In the present study researchers tried to study the awareness of Information and Communication Technology of Secondary students and ascertain relationship between awareness of ICT and Academic Performance of SSC, CBSE and ICSE Secondary students with respect to gender and school types. Descriptive method was used for the study, Five point rating scale was constructed for the data collection. Data was analyzed using t-test, Coefficient of Co-relation and ANOVA. It was found that there is significant relationship between the awareness of Information and Communication Technology and perceived impact of ICT on Academic Performance of Secondary students with respect to Gender and school type. ICT awareness is there in students of SSC,ICSE and CBSE boards, but there is significant difference in ICT awareness and perceived impact on Academic Performance on the basis of Gender and school type.

53) **Dhaval B. Patel (2013)** conducted study on “Construction and Effectiveness of Computer Aided Instruction (CAI) Programme for the Units of Science and Technology of Standard VIII”. Computer-
based education (CBE) and computer-based instruction (CBI) are the broadest terms and can refer to virtually any kind of computer use in educational settings. Computer-assisted instruction (CAI) is a narrower term and most often refers to drill-and-practice, tutorial, or simulation activities. Computer-managed instruction (CMI) is an instructional strategy whereby the computer is used to provide learning objectives, learning resources, record keeping, progress tracking, and assessment of learner performance. Computer-based tools and applications are used to assist the teacher or school administrator in the management of the learner and instructional process. Objectives of the Study

(1) To construct Computer Aided Instruction (CAI) Programme for the units ‘Carbon’ and ‘Some Common Diseases’ of Science and Technology subject of Standard 8th

(2) To construct Academic Achievement test for the units ‘Carbon’ and ‘Some Common Diseases’ of Science and Technology subject of Standard 8th.

(3) To Study the effect of CAI Programme and Lecture method on Academic Achievement through post-test.

Hypothesis:

Ho1: There is no significant difference between mean Scores of Students of Experimental group and Control group in post-test.

Ho2: There is no significant difference between mean Scores of Girls of Experimental group and Control group in post-test.

Ho3: There is no significant difference between mean Scores of Boys of Experimental group and Control group in post-test.

Sample: To keep in mind the population of the Present research study, schools were selected through purposive sampling method by the researcher.

Tools Used: The Researcher had prepared Computer Aided Instruction Programme of the units Carbon and Some Common Diseases of Science and Technology subject of Standard 8th in the present study. Achievement test was also constructed by the investigator.

Data Analysis: The collected data were subjected to various statistical analyses (mean, Standard Deviation,
standard error, C.R., kurtosis, skewness, Q, p10, p 90) and the results obtained were interpreted. Result: In the present study, from the data and statistical analysis the following findings were made mentioned as below. (1) There is significant difference between mean scores of Control Group and Experimental Group Students in Post test which is in favour of Experimental group. So, it is concluded that CAI method is more effective than Lecture method. (2) There is significant difference between mean scores of Girls of Control Group and Experimental Group, Boys of Control Group and Experimental Group in Post test. So, it Can be said that academic achievement of boys and girls who were taught through CAI method was higher than that of academic achievement of boys and girls who were taught through Lecture Method.

54) *Ndawula Stephen and Kahuma B James et al., (2013)*, conducted study on “Getting Schools Ready for Integration of Pedagogical ICT: the Experience of Secondary Schools in Uganda”. The purpose of the study was to establish whether secondary schools in Uganda are prepared for effective teaching of ICT education. The study was carried out in six secondary schools in Uganda. Both qualitative and quantitative research methods with a descriptive cross sectional survey design were adapted to collect data from 96 respondents. Questionnaires and interviews were employed as data collection instruments. The study findings showed that, the introduction of ICT education as a subject in the secondary school curriculum is a good government’s policy that will bring in every secondary school graduate to the use of internet, world of employment creativity, knowledge and use of internet and other related technologies for national development. The findings further revealed that success of the ICT education policy will depend on governments’ effort to recruit well qualified teachers in the subject, supply of enough computers, and
construction of adequate computer laboratories and libraries in all secondary schools and availability of a reliable power supply in the country.

55) **K.S. Dedun (2013)** conducted study on “A Study of Teacher Attitudes towards Use of ICT in Classroom of Secondary School of Sabarkantha District”. This study synthesizes the research literature on teachers use of Information and Communication Technology (ICT) in secondary schools in Sabarkantha district. The present study was applied research and as well as present study was of quantitative research. **Objectives**: (1) To Construct attitude scale for study towards use of ICT in classroom. (2) To compare attitude towards use of ICT in classroom with respect to gender. (3) To compare attitude towards use of ICT in classroom with respect to type of school (4) To compare attitude towards use of ICT in classroom with respect to type of medium of instruction in School. In this research attitude scale for Use of ICT in classroom To assess attitude the use of ICT in classroom by teachers the authors developed a scale. Likert’s method of summated rating procedure for the construction use of ICT in classroom attitude scale was followed five types of responses were selected for each item which were strongly agree to strongly disagree. In order to study the significant difference in score of attitude scale of teachers with regarded to gender, type of school and type of medium of instruction in School ‘t’ test was employed. With use of present study researcher give a direction in this way the traditional classroom teaching is outdated now as a teaching method. In present day use of ICT in classroom is a very advance technique of teaching. However, awareness of this type teaching method is less in teacher knowledge. **Findings of the study reveal that**: (1) There was significant difference between male and female teachers mean score of attitude scale for use of ICT in classroom. In which Male teachers attitude towards use of ICT in classroom is more positive
compare to the female teachers. (2) There was significant difference between granted school and self financed school teachers mean score of attitude scale for use of ICT in classroom. in which self financed school teachers attitude towards use of ICT in classroom is more positive compare to the granted school teacher. (3) There is no significant difference between Gujarati and English medium school teachers mean score of attitude scale for use of ICT in classroom. In which English medium school teachers attitude towards use of ICT in classroom is more positive compare to the Gujarati medium school teachers.

56) **Gokhan Aksoy (2013)**, conducted study on “Effect Of Computer Animation Technique On Students' Comprehension Of The ‘Solar System And Beyond’ Unit In The Science And Technology Course”. The purpose of this study is to determine the effect of computer animation technique on academic achievement of students in the ‘Solar System and Beyond’ unit lectured as part of the Science and Technology course of the seventh grade in primary education. The sample of the study consists of 60 students attending to the 7th grade of primary school under two different classes during the 2011-2012 academic year. While the lectures in the class designated as the experiment group were given with computer animation technique, in the class designated as the control group Powerpoint presentations and videos were utilized along with the traditional teaching methods. According to the findings, it was determined that computer animation technique is more effective than traditional teaching methods in terms of enhancing students’ achievement. It was also determined in the study that, the Powerpoint presentations and related videos used together with the traditional teaching methods provided to the control group significantly help the students to increase their academic achievement.