CHAPTER-II

REVIEW OF RELATED LITERATURE
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2.1.0 INTRODUCTION

Research in any field implies a step ahead in the exploration of the unknown concepts. The investigator should prepare himself/herself properly to explore the unknown concepts. One such preparation is the collection of appropriate knowledge of what has already been done in a particular field. A step towards unknown can only be taken after a thorough review of the related literature and researches conducted in that area. Any research without such a review of related literature is likely to be a building without any foundation. The review of related literature provides a clear picture of the study to be taken as a pre-requisite to the proper planning of the problem and conducting the research. The review of the past investigations in a particular field serves as a guide to the investigator as it helps him/her to avoid duplication of the work already done in that area. The knowledge that what has already been done in the area of researches regarding the methods used for data gathering and the results of their analysis, keeps the investigator systematic in his/her own endeavour.

According to John W. Best, 37 "Practically all human knowledge can be found in books and libraries. Unlike other animals that must start a new with each generation, man builds upon the accumulated and recorded knowledge of the past. His constant adding to the vast store of knowledge makes possible progress in all area of human endeavour".

According to Borg,38 “The literature in any field forms the foundation upon which all future work will be built. If we fail to build the foundation of knowledge provided by the review of literature our work is likely to be shallow and naive and will often duplicate work that has already being done better by someone else”.

2.2.0 INDIAN STUDIES

Vardhini, V.P. (1983) studied “Development of a Multimedia Instructional Strategy for Teaching Science (Physics and Chemistry) at Secondary Level” The objectives of the study were (i) to develop a validated multimedia instructional strategy for teaching science (physics and chemistry) in Standard VIII, (ii) to study the relationship between achievement using the strategy and intelligence and scientific attitude, (iii) to develop alternative instructional inputs and study their effectiveness, and (iv) to study the feasibility of the strategy in terms of time and cost. The major findings of the study were: 1. Almost all the units indicated average/high level of performance on the total test. 2. The strategy was found valid against the criterion of scientific attitude in that significantly higher performance was noted for the group in the posttest over the pretest. 3. Validity of the strategy was established from reactions expressed by students for its continuance and also their improvement in science achievement. 4. Intelligence and achievement using the strategy presented a significant relationship. 5. A significant relationship was found between scientific attitude and achievement for the experimental group and control group. 6. Visual projections with teacher explanation and those with taped commentary were equally effective in terms of achievement. 7. Programmed material and discussion sequence were equally effective on the total test. 8. The strategy was found feasible when seen in terms of its reproducibility and the cost management by individual schools.39

Singh, R.D.; Ahluwalia, S.P.; and Verma, S.K. (1991) conducted a study on “Teaching of mathematics: Effectiveness of Computer Assisted Instruction (CAI) and conventional method of instruction”. Objectives of the study were (i) to study the difference in mathematics achievement which occurs as a result of the difference in instructional strategy among boys and girls separately and as a group, and (ii) to study the direction of change in attitudes of male and female students separately and as a group towards mathematics as a result of two different instructional strategies. Major findings of the study were (i) the students who used the computer scored significantly higher than those taught mathematics through the conventional method, (ii) the students who used the computer showed the significantly highly favourable attitude towards mathematics than those who did not use the computer, (iii) achievement in mathematics and change in attitude towards mathematics were found to be independent of the sex factor.

Reddy and Ramar (1995) have attempted to study the effectiveness of multimedia modular approach as against traditional method in teaching mathematics to low achievers. The experiment proved that the multimedia modular approach did help the poor achievers in doing better in mathematics.

Joshi, Anuradha and Mahapatra, B.C. (1997) conducted a study on “Effectiveness of computer software in terms of reasoning ability in science”. Objectives of the study was to compare the developed software package with traditional method in terms of reasoning ability in science by considering intelligence as a co-variate. They found that (i) it was found that adjusted mean scores on overall reasoning ability in science and its aspects of the students taught through developed software package differed significantly from those taught through traditional method when intelligence was taken as a co-variate, (ii) the adjusted mean for analogy classifications, eclectic, deductive inductive reasoning and overall reasoning in science of students taught

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through developed computer software package were significantly higher than the corresponding figures for those taught through traditional method.\footnote{Joshi, Anuradha and Mahapatra, B.C. 1997 conducted a study on, “Effectiveness of computer software in terms of reasoning ability in science”, \textit{Indian educational Abstracts}. Issue 5, July 1998; p.39}

**Pulist, S.K. (2001)** conducted a study on “Transition to Internet-Based Learning in IGNOU: A Learner’s Perspective”. The objectives of the study were: (i) To analyse the method and procedures adopted by IGNOU to provide support services to the Internet learners; (ii) to study the problems faced by the learners who initially opted for Internet mode; (iii) to analyse the operational difficulties of the University in accomplishing the task of providing support services to the Internet learners; and (iv) to highlight various uncontrollable variables which affected the operations of the University. The major findings of the study were: (i) The programme was directly managed and run by the School of Computer and Information Science, Other outlets (Regional Centres and Study Centres) were not involved in the programme delivery; other wings of the University were not able to give the core information pertaining to Internet programmes to the learners. However, utilization of the University network throughout the country could have helped in removing misgivings of the aspirant learners about the programme; (ii) The Internet Access Points empanelled by the University did not come up to the expectations of the learners and became the major source of problem generation not only for the students but for the university as well. Many Internet Access Providers (IAPs) were not providing the quality services for which they were, in fact, empanelled. Since, the learners were utilizing Internet as their study Centre for all intents and purposes, the extent of dependence of the learners on these IAPs was very high; (iii) The University Website needs to be managed professionally in order to enhance its performance level and outside agency could be engaged for the purpose in case in-house expertise is not available.\footnote{Pulist, S.K. (2001). "Transition to Internet-Based Learning in IGNOU: A Learner’s Perspective", \textit{Indian Journal of Open Learning}, Vol. 10(2), p.135-149.}

**Balasubramanian, N. and Meera, S. (2002)** conducted a study on “Relative Effectiveness of Different Modes of Computer - Based Instruction in Teaching Biology”. The major objectives of the study were: (i) To find out whether there is any
significant difference among the different modes of Computer Assisted Instructional strategy viz. Tutorial, Drill and Practice in realizing and instructional objectives in Biology at Standard XI; (ii) to develop a Criterion Referenced Test in the content areas being instructed to subjects of control and experimental groups; (iii) to develop syllabus based Computer Based instructional packages in different modes viz. Tutorial, Drill and Practice and Simulation for the selected content areas. The major findings of the study were: (i) CAI in Drill and Practice is more effective than the Tutorial and Simulation modes in teaching Biology at Standard XI; (ii) more software packages can be developed for the whole syllabus which will help the students to learn at their own pace; (iii) the CAI packages in Biology should be planned, developed, evaluated and implemented with the help of a team of experts constituting curriculum planners, educational technologists, computer experts and biology teachers. It will be helpful in the development of quality packages in the teaching and learning of Biology. \(^\text{44}\)

**Sharma, A. and Sansanwal, D.N. (2002)** conducted a study on “Comparison among Video-based Instructional Strategies for Teaching Science at Class IX Level in Terms of Achievement”. The study aims to compare the mean scores of achievement of student in Science belonging to different video-based instructional strategies for teaching science at Class IX level. The findings of the study were: (i) The treatment had significant effect on achievement in science of students belonging to different video-based instructional strategies for teaching science; (ii) the video viewing followed by lecture as well as video viewing followed by discussion were significantly higher than those of video viewing only; (iii) the mean scores of science achievement of video viewing followed by lecture was found to be significantly superior to video viewing followed by discussion”. \(^\text{45}\)

**Shinde, J. (2002)** conducted a study on “Effectiveness of Multimedia CAI Package with Reference to Levels of Interactivity and Learning Style”. The objectives of


study were: (i) To prepare multi-media CAI packages with two levels of interactivity viz. high and low; (ii) to test effectiveness of the prepared CAI packages; (iii) to find out the extent to which scholastic achievement of the learner is affected by the levels of interactivity; (iv) to find out the extent to which scholastic achievement of the learners is affected by the learning style in two different environments (learning through CAI with high level of interactivity (HCAI) and learning through CAI with low level of interactivity (LCAI). The findings of study were: (i) HCAI was effective in terms of achievement; (ii) LCAI can also bring significant increase in the achievement scores; (iii) the two sample groups were not significantly different and were selected from the same population; (iv) the interactivity plays major role in enhancing the achievement of the learners learning through CAI; (v-a) diverges and converges show significantly higher performance than Assimilators while learning through HCAI. Accommodators were also found performing better than Assimilators though not significantly; (v-b) the diverges and Accommodators found to learn with non-interactive mode; (vi) most of the learners appreciated multimedia inputs in the CAI packages; (vii) CAI mode was considered to be an effective and efficient mode of learning. The preference for this mode was higher in case of HCAI than LCAI.

**Vekaria, V.J. (2002)** conducted a study on “An exploration in the teaching of science for standard VIII on the unit of agriculture through a video instruction programme”. The major findings of the study were: (i) The video instructional programme developed was effective in the urban as well as rural areas of Saurashtra, Central Gujarat and South Gujarat; (ii) the video instructional programme was found equally effective in the urban as well as rural areas of entire South Gujarat; (iii) the effectiveness of the programme was found directly proportional to the level of achievement in all the three areas; (iv) the students and teachers were found to have positive reaction towards the video instructional programme.

**Vij, S. (2003)** conducted a study on “A comparative study of the Effectiveness of...”

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Computer Assisted Instruction (CAI) and Computer Managed Instruction (CMI) on pupil’s Achievement in Science, their Self-Concept and Study Involvement”. The objectives of the study were: (i) To design and develop instructional plan for teaching selected unit in Science amongst the prescribed course of study at class VII stage based on Computer Aided Instructions (CAI) & Computer Managed Instructions (CMI); (ii) to construct and standardize Achievement test in selected units of Science for class VII; (iii) to study individual effectiveness of CAI on Self-concept; Study involvement; and Academic Achievement; (iv) to study individual effectiveness of CAI on self concept; study involvement; and academic achievement (v) to compare the effectiveness of CAI and CMI instructions on Self-concept of students; (vi) to compare the effectiveness of CAI and CMI instructions on study involvement of students; and (vii) to compare the effectiveness of CAI and CMI instructions on Academic Achievement of students. The findings of the study were: (i) At the end of the experiment, it was found that the group of pupils taught Science through Computer Assisted Instructions was effective in raising the Self-concept of the pupils; (ii) the post-test mean scores of the pupils taught Science through Computer Assisted Instructions increased significantly which indicates that Computer Assisted Instructions enhanced study involvement of the pupils: (iii) the group of pupils taught Science through Computer Assisted Instructions showed significantly higher post-test mean score on Achievement in Science in comparison to pre-test mean Achievement score; (iv) at the completion of experiment, it was found that the group of pupils taught Science through Computer Managed Instructions was effective in raising the study involvement of the pupils; (v) the post-test mean score of the pupils taught Science through Computer Assisted Instructions was found to be significantly higher on increasing the study involvement in comparison to pre-test score: (vi) the group of pupils taught Science through Computer Managed Instructions showed significantly higher post-test mean scores on Achievement in Science in comparison to pre-test score; (vii) the group of pupils taught Science through Computer Managed Instructions achieved significantly higher mean score on the test of Self-concept than the Pupils taught Science through Computer Assisted Instructions; (viii) at the post-test mean score of the group of Pupils taught Science through Computer Managed Instructions was significantly higher on the test of Self-concept than the group of pupils taught Science through traditional method; (ix) there was no significant difference in Self-concept between the group of pupils taught Science through Computer Assisted Instructions and
the group of pupils taught Science through traditional method; (x) the mean gain score of the group of pupils taught Science through Computer Managed Instructions was found to be significantly higher on the test of Self-concept, than the group of pupils taught Science through Computer Assisted Instructions; (xi) the group of pupils taught Science through Computer Managed Instructions showed significantly higher mean gain score on the test of Self concept than the group of pupils taught Science through traditional method; (xii) there was no significant difference between the group of pupils taught Science through Computer Assisted Instructions and the group of pupils taught Science through traditional method on the mean gain score of Self-concept; (xiii) the post-test mean score of study involvement of the group or pupils taught Science through Computer Assisted Instructions was significantly higher than the group of pupils taught Science through Traditional Method; (xiv) the group of pupils taught Science through Computer Managed Instructions achieved higher mean score on study involvement than the group of pupils taught Science through Traditional Method; (xv) there was no significant difference in the post-test mean score of study involvement between the group of pupils taught Science through Computer Managed Instructions and the group of pupils taught Science through Computer Assisted Instructions; (xvi) the group pupils taught Science through Computer Assisted Instructions showed significantly higher mean gain score on study involvement than the group of pupils taught Science through traditional method; (xvii) the mean gain score on study involvement of the group of pupils taught Science through Computer Managed Instructions was found to be significantly higher than the group of pupils taught Science through traditional method; (xviii) there was no significant difference in the mean gain score of study involvement between the group of pupils taught Science through Computer Managed Instructions and the group of pupils taught Science through Computer Assisted Instructions; (xix) the post-test Achievement mean score of the group of pupils taught Science through Computer Managed Instructions was significantly higher than the group of pupils taught Science through Computer Assisted Instructions; (xx) the group of pupils taught Science through Computer Assisted Instructions showed significantly higher gain in mean Achievement score than the group of pupils taught Science through traditional method; (xxi) group of pupils taught Science through Computer Managed Instructions achieved significantly higher mean score on Achievement than the group of pupils taught Science through traditional method; (xxii) the mean gain score of the group of pupils taught
Science through Computer Managed Instructions was found to be significantly higher on Achievement than the group of pupils taught Science through Computer Assisted Instructions; (xxiii) the group of pupils taught Science through Computer Assisted Instructions showed significantly higher mean gain score on Achievement than the group of pupils taught Science through traditional method; (xxiv) the mean gain score of the group of pupils taught Science through Computer Managed Instructions was found to be significantly higher in Achievement than the group of pupils taught Science through traditional method.48

Vasanthi, A. and Hema, S. (2003) conducted a study on “Effectiveness of Teaching Chemistry for 1 Year B.E. Students through Computer Assisted instruction”. The major objectives of the study were: (i) To study the effectiveness of teaching chemistry through Computer Assisted Instruction over the Traditional Teaching Method; (ii) to study the effectiveness of the Computer Assisted Instruction over the Traditional Teaching Method in pre-test scores. The major findings were: (i) There was significant difference between the mean gain score of the control group taught through TTM and the experimental group administered by the CAI in all unit put together; (ii) there was no significant difference between the mean scores of the pre-test of control group taught through TTM and experimental group administered by CAI in all units put together (Electro Chemistry and Bonding); (iii) there was significant difference between the mean scores of post-test of control group taught through TTM and experimental group administered by CAI in all units put together. 49

Desai, B.Y. (2004) carried out a 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 findings of the study were: (i) The mean achievement


of the experimental group was found significantly higher than that of the control group: (ii) From post-test to retention test almost equal reduction in performance was found in both the groups (iii) the students were found to have favourable opinions towards the multimedia approach; (iv) the study has found the relative efficacy of teaching through the traditional method and multimedia approach in the subject of Home Science, particularly, proteins.\(^{50}\)

**Jothiokani, N. and Thiagarajan, A.P. (2004)** studied “Effectiveness of Computer Assisted Instruction in Mathematics among B.Sc. Degree Student”. The major objectives of the study were: (i) To analyse the efficiency of teaching B.Sc. Degree (Mathematics) students through CAI over conventional method for knowledge; (ii) to compare effectiveness of teaching mathematics through CAI to B.Sc. Degree (Mathematics) students over conventional method in terms of the levels of achievement; and (iii) to study the effectiveness of teaching mathematics through CAI to B.Sc. Degree students over conventional methods in terms of objectives of teaching mathematics and their level of achievement. The findings were: (i) There was no significant difference between the mean scores of pre-test for control groups and the experimental groups in all six units with reference to the objectives such as knowledge, Comprehension and Application and their level of achievement such as Low, Average and High Achievers; (ii) the mean scores of post-test of control group were significantly higher than that of the experimental group in all six units with reference to the objectives and their level of achievement in both the years 1999-2000 and 2001-02; (iii) the mean gain scores of the control group were significantly great, than that of experimental group in all six units with reference to the objectives and their level of achievement in both the years 1999-2000 and 2001-02.\(^{51}\)


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Effectiveness”. The major objectives of the study were: (i) To develop computer assisted lesson on the topic - UNO in History at higher secondary level, (ii) to test the effectiveness of the computer assisted teaching and lecture method in the lesson on the topic, UNO in History and Higher Secondary level and (iii) to verify the impact of gender, domicile and type of school on the effectiveness of computer assisted teaching method. The findings of the study were: (i) While both the methods led effective learning, the CAT method was found superior to that of the Lecture method; (ii) it is interesting to note that there is no gender difference on the scores obtained.52

**Macwana, S. (2004)** conducted a study on “A study of Development and Effectiveness of Computer Assisted Learning Material for Class IX Students”. The study focused on the development of Computer Assisted Learning Material (CALM) on Optics for Standard IX Gujarati medium students and to find out its effectiveness in terms of the achievement of students and Reactions of the students and teachers. The study revealed that CAL was effective in terms of achievement and reaction.53

**Kohli, M. (2005)** conducted a study on “Efficacy of Computer Assisted, Concept Attainment Models on Students’ Achievement in Environmental Science, self-Concept and Emotional Intelligence”. The objective was to compare the mean gain achievement scores, self-concept scores and emotional intelligence scores with the help of Computer Assisted Model and Concept Attainment Model before and after the experimental treatment. The findings were: (i) Computer Assisted Model and Concept Attainment Model were found to be effective in improving the achievement level of students; (ii) learning with Computer Assisted Model and Concept Attainment Model changed the aptitude and interest of the students. Unlike conventional method, students got feedback and remedial teaching which automatically improved their achievement and promoted their self-concept; (iii) Computer Assisted Model and Concept Attainment Model was

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shown to be very effective in enhancing the emotional intelligence of the students.\textsuperscript{54}

**Pardeshi, R. (2005)** conducted a study on “The relative effectiveness of CAI an CAIPI in learning Trigonometry by English medium students of Standard IX of Baroda City”. The objectives of the study were to develop the CAI and study its effectiveness in mono, diad and triad settings and its relative effectiveness in the three settings and through reactions of the students. The findings of the study were: (i) No significant difference has been found in the mean achievement scores of the experimental group in mono, diad, triad and control groups, respectively; (ii) significant difference has been found in the mean achievement scores of the experimental group in triad and control group; and (iii) the students were found to have positive reactions towards the developed CAI.\textsuperscript{55}

**Pareek, R. (2005)** conducted a study on “Computer Curriculum in Teacher Education Program: An Analytical Study”. The objectives were: To study the computer programme running at different Teacher Training Colleges in Rajasthan for (a) Teacher Trainee, Teacher and Principals attitude towards computer programme, (b) Units of Programme, (c) Evaluation Process, and (d) Usage of Learning Experiences. The findings were: (i) Teacher trainees, teacher and principals keep a positive attitude towards computer programme; (ii) different colleges of different university of Rajasthan have similar units of computer programme as their syllabus; (iii) the evaluation procedure of different teacher training colleges were different though their objectives remained the same; (iv) The usage of computer related learning was not carried out for different educational activities.\textsuperscript{56}


Sarupria, S. (2005) conducted a study on “Status, Issues and Future Perspective of Computer Education in Senior Secondary Schools”. The main objectives of her study were: (i) To study the status of Computer Education Programme (CEP) in schools in terms of physical facilities, financial provisions, human resources, curriculum and its execution; (ii) to compare the status of CEP on the basis of demographic variables like situation of school (rural and urban) and the type of school management (government and private); (iii) to identify issues related to CEP in schools effective and futuristic; (iv) to perceive the future of CEP in schools (2012 AD); (v) to suggest a model for making CEP in schools effective and futuristic. Descriptive field survey was used to study the status and issues, whereas the Delphi Technique was used to perceive the future of CEP. The major findings of the study were: (i) CEP started in a majority of schools in Rajasthan after the class project in 1986 and was being run on the contract basis in two-third of the schools; (ii) most of the schools had computer laboratories with basic computer facilities, but there were certain issues that need immediate attention like; status of contract computer teachers in terms of salaries, teaching experience, permanent appointment of staff and in-service training; budget for CEP; dissatisfaction of students towards the quality of study materials; lack of correlation between theory and practice; guidance given by teachers during practical classes; and the ICT policy of the state of Rajasthan for implementing CEP in schools; (iii) the status of CEP was particularly poor in government and rural schools, when compared with private schools and urban schools respectively; (iv) students possessed high level of interest in CEP and an average awareness towards Internet; (v) most of the experts predicted a promising future of CEP in schools by 2012 AD: in all respects except hardware maintenance and availability of computers for all students; and (vi) experts did not foresee any substantial improvement in the status of CEP in rural government schools.57

Jayaraman, S. (2006) carried out “A study of the relative effectiveness of Computer based Multimedia Learning Packages on performance and behavioural outcomes of students of different age groups”. Various findings of the study were: (i) The CBMMLP prepared specifically for the particular concepts were significantly effective for all the age group of students. There has been found a higher usage by higher age group students; (ii) the relative effectiveness of the CBMMLP was 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 learned through CBMMLP was higher than the performance of the students who have not learned through CBMMLP; (iii) higher age group students have been found to have more positive attitude towards CBMMLP than the lower age group students; (iv) 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; (v) higher age group of students have been found satisfied more in the interaction with the CBMMLP. Also, 74.2% of class XI students were found having prior knowledge of the computer. 75% of the class V students could not express either their satisfaction or about their prior knowledge.  

Patil, A.T. (2006) conducted “A study on development of Multimedia Instructional System on Computer Education for B.Ed. pupil Teachers”. Various findings of the study were: (i) The present setting of teaching of computer education in B.Ed. colleges was found unsatisfactory; (ii) it was found feasible to design, develop and implement a computer based Multimedia Instruction System for the Computer Education; (iii) no significant difference was found between the performance or the pupil-teacher of control and experimental group on pre-test; (iv) significance difference was found between the performance of the pupil teachers of control group and experimental group on post-test; (v) significant difference was found between the performances of the pupil-teachers of control group from pre-test to post-test; (vi) there was significant difference between the performance of pupil-teachers of experimental group from pre-test to post-test; (vii) there was significant difference between the gains in achievement in terms of scores in pre-test and post-test of the pupil-teachers from pre

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to post-test; (viii) there was significant difference between the performance of the pupil-teachers from control and experimental groups in retention test.\(^5\)

**Jyothi, K.B.S. (2007)** conducted a study on “Impact of Computer-Based Learning on Students of Chemistry”. The objectives of the study were: (i) To prepare a self-instructional module on the topic “Chemical Bond” for IX\(^{th}\) class Chemistry; and (ii) to compare the effectiveness of this Self-Instructional module with conventional teaching method. The study clearly revealed that the instructional module prepared by a teacher through simple power point presentation could show immense impact on learning of chemistry. Since the preparation of this module was very easy and simple; it has opened a new way and was very much helpful to teachers in their physical science instruction.\(^6\)

**Maniar, A. and Bhatt, D. (2007)** conducted a study on “Designing Educational CD-ROM for Higher Education Students”. The major findings of the study were: (i) The educational CD-ROM on topic “Graphic Aids” was effective in terms of gain in knowledge; (ii) there was significant difference in gain in knowledge amongst the students of experimental group; (iii) there was significant difference in gain in knowledge of the students of experimental group in learning through developed CD-ROM in relation to the following variables: (a) Medium of instruction; (b) Type of computer User; (iv) there was no significant difference in the gain in knowledge of the students of experimental group in relation to these variable: (a) Academic achievement, (b) Economic status (c) Exposure to ICT, (d) Accessibility to computer; (v) majority of the features of the developed CD-ROM helped the students in learning; (vi) majority of the students reported that majority of the aspects of the CD-ROM helped the students to learn to a great extent; (vii) majority of the students reported problems related to CD not running well, computer hanged and background music; (viii) majority or the students suggested that the background music could be more pleasing, CD could be made more

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explanatory, more visual should be added for the content clarity and note taking facility should be more flexible.  

Nimavathi, V. and Gnanadevan, R. (2008) conducted a study on “Effectiveness of Multimedia Programme in Teaching Science”. Objectives of the study were: (i) To prepare multimedia package for the teaching of Science at secondary level; (ii) to find out the effectiveness of computer multimedia program in the teaching of science at secondary level; (iii) to compare the effectiveness of computer multimedia programs in the teaching of science with traditional method of teaching science. The findings of the study were: (i) There was no significant difference between the experimental group and control group in the achievement of science at pre-test level; (ii) there was a significant difference between the experimental group and control group in the achievement of science at post-test level. The students learning with the help of multimedia program were fared better in science than the students learning through the conventional method; (iii) there was a significant difference between the mean achievement test scores of the pre-test and post-test for the experimental group. This shows that the multimedia program has helped the students to score more marks in the post-test; and (iv) there was no significant difference between the pre-test and post-test in the achievement of science for the control group. This has shown that the conventional method of teaching will not help the students to score more marks in the post-test.

Mehra, V. and Newa, D.R. (2009) conducted a study on “School teachers’ Attitude toward Information and Communication Technology (ICT)” to investigate the attitude towards Information and Communication Technology of 300 school teachers of Secondary Schools of Nepal. On the whole, they found that the school teachers

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exhibited positive attitude towards Information and Communication Technology.\textsuperscript{63}

**Singh, H. and Mishra, R.S. (2009)** conducted a study on, “Effectiveness of E-Learning: An Experimental Study”. The objective of the study was to compare performance in theory course, namely, Essentials of Educational Technology and Management of B.Ed. students provided internet facility along traditional teaching and B.Ed. students taught through simple traditional method. They found that group of pupil teachers taught traditionally with Internet support were superior to their counterpart pupil teachers taught only through traditional method.\textsuperscript{64}

**Husain, Naushad. (2010)** studied “Computer Based Instructional Simulation in Education: Why and How” The major objective of the study was to study the role of Computer Based Instructional Simulation for teaching and learning. The study found that Computer Based Instructional Simulation has a lot of advantages in terms of instructional methodology. The most important factor in Computer Based Instructional Simulation is to make significant instructional situations. There was also evidence that ICT positively influenced attitudes towards school work and school behaviour.\textsuperscript{65}

**Ponraj, P. and Sivakumar, R.(2010)** carried a study on “Computer-Assisted Instruction in Zoology in Relation to Learner’s Personality” The major objectives of the study were: (i) To develop and validate CAI software for teaching zoology for XI standard students; (ii) to find out whether there is any significant difference between the students’ achievement scores in zoology of the control group and experimental group at pre-test level; (iii) to find out whether there is any significant difference between the students’ achievement scores in zoology of the control group and experimental group at


post-test level; (iv) to find out the effect of CAI software on the achievement in zoology in different learning objectives such as Knowledge, Understanding, Application and Skill; (v) to find out whether there is any significant difference between control group and experimental groups of students’ achievement in zoology in different categories subsample wise- Gender, Locality of the students, Parental Education, Parental Occupation, Computer Knowledge and Residence of the students; (vi) to find out whether there is any significant difference between the students’ achievement scores in zoology of the control group and experimental group based on different personality types; (vii) to find out whether there is any significant difference between the students’ achievement of the follow-up tests conducted during the treatment for standard XI students. The major findings of the study are (i) there is no significant difference between the students’ achievement scores in zoology of the control group and experimental group at pre-test level; (ii) difference between the students’ achievement scores in zoology of the control group and experimental group at post-test level is significant, experimental group achieved better; (iii) the difference between the students’ achievement scores in learning objectives Knowledge, Understanding, Application and Skill is significant; experimental group performed better; (iv) there is significant difference between control group and experimental groups of students’ achievement in zoology in different categories subsample wise- Locality of the students, urban students performed better; there is no significant difference between control group and experimental group students’ achievement in zoology on the basis of- Gender, Parental Education, Parental Occupation, Computer Knowledge and Residence of the students; (v) students of experimental group with personality traits as Extroversion, Thinking and judging achieved significantly better than those of the contrasting personality traits.

Uplane, Megha M., Sonawane, Sanjeev A. and Padmini, M.S. (2011) conducted a study on “CAI: An Effective Instructional Method for Secondary School Low Achiever”. The major objectives of the study were (i) To identify low achievers in physics; (ii) to develop textbook-based computer multimedia software package; (iii) to

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test the effectiveness of the developed software package for enhancing the academic achievement of low achievers in physics. The study found that there is significant difference in the mean achievement scores obtained in the pretest and posttest obtained by low achievers in physics of VIII standards. The performance of students in posttest and retention-test for questions on ‘Physics content’ was better than in pretest.\(^6\)

2.3.0 STUDIES ABROAD

**Rose, Antony Stella V. (1992)** conducted a study on “Effectiveness of computer assisted instruction with special reference to underachievers”. Objectives of the study were (i) to develop CAI software, (ii) to find out the effectiveness of CAI with TSS and CAI without TSS with reference to the learner variables, viz. sex, locale, I.Q., and achievement level, and (iii) to find out the interaction of the learner variables and the treatment on the achievement score. Major findings of the study were (i) both the CAI strategies were superior to the traditional method of instruction, and CAI with TSS was more effective than CAI without TSS for underachievers (ii) except achievement level, all the other learner variables combined with the treatment had no interaction effect on the achievement score (iii) there was no relationship between the post-treatment scores and the variables ‘sex’, ‘locale’ and ‘achievement level’ of the experimental group. In the case of the variables I.Q., ‘study habits’ and ‘math study attitude’, the positive relationship between those variables and achievement at the pre-treatment level was found to be cancelled at the post-test. Similar results were obtained for underachievers.\(^{68}\)

**Almulla (1995)** conducted a study on “Study of the influence of computer animation on learning”. The major objective of the study was (i) To test the hypothesis that the animated visual graphics would help subjects to achieve more learning than non-animated visual graphics. It was found that the dynamic group had higher achievement scores than the static group.\(^{69}\)

**Proctor, J.D. and Richardson, A.E. (1995)** conducted a study on “Evaluating effectiveness of multimedia computer modules as enrichment exercises for introductory human geography”. The objectives were to determine overall effectiveness of computer

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modules as well as the kinds of students and kinds of geographical knowledge and skills they best served. The results were presented of a careful experimental evaluation of two multimedia computer modules used as enrichment devices for an introductory human geography course at the University of California Santa Barbara. The rather disappointing results in respect of all three of these areas tend to corroborate one published allegation that quantitative evaluation of multimedia effectiveness is itself ineffective, due primarily to the inherent complexity of learning. The conclusion of the study was that an array of quantitative and qualitative evaluation methods will better serve the important objective of improving multimedia use at the university level.70

Linn, S. E. (1997). conducted a study on “The Effectiveness of Interactive Maps in the Classroom: A Selected Example in Studying Africa” A two-week experiment was conducted where seventh graders researched and produced map products using both traditional and computer-assisted techniques. Quantitative results showed little difference in learning content between the groups but qualitative results suggested that students prefer the computers.71

Watson, D., Blackeley, B. and Abbott, C. (1998) conducted a study on “Researching the Use of Communication Technology in Teacher Education” to explore the reality of communications between teacher trainers in the university their co-tutor partners in schools. The objective of the study was that what effect does the establishment of e-mail and conferencing facilities have upon the initiation, content and range of communication, and indeed the pedagogy of teacher education. The trial involves three college lectures, six of their teacher tutor colleagues in schools and their PGCE students. According to findings preliminary results has indicated that identifying


and getting operational suitable means of communication were fraught with difficulties. Impoverished and differential resourcing was a major inhibitor to schools going “on line”. Teacher educators, whether in universities or schools appear ICT, with a complex set of perceptions that may be at odds with reality. The staff of university computer networks fail to understand users’ needs of distributed and distance networks. But most significantly it is clear that the existing partnership relationships between trainers in college and schools was out of balance, operating in parallel rather than together, and based upon substantial misconceptions.  

Yardley (1998) studied about “Training of teachers in the use of computer” A major finding of the study was the training is a must and should be specifically targeted for the curricula to be effective.  

Hajzainuddin, A.M. (1999) conducted “A study of learning styles and hypermedia’s organizational structures in a Web-based instructional programme designed for trainee teachers at the international Islamic University, Malaysia”. He has found no significant relationship between the information-processing characteristics of learning style and performance. In addition, he found no significant interaction among the factors of learning style, hypermedia’s organizational structure and attitude.  

Stark, R., Simpson, M., Gray, D. and Payne, F. (2000) conducted a study on “The impact of information and communications technology initiatives” to assess the impact of a variety of ICT initiatives on pupils’ skills and knowledge. Researchers have found that ICT improved motivations, enhanced learning and teaching, improved  


Dilek A. and Sevil A. (2002) conducted a study on “Effectiveness of multimedia-based instruction that emphasizes molecular representations on students’ understanding of chemical change”. The study made use of the capabilities of computerized environments to enable simultaneous display of molecular representations that correspond to observations at the macroscopic level. This study questioned the immediate and long-term effects of using a multimedia instructional unit that integrates the macroscopic, symbolic, and molecular representations of chemical phenomena. Forty-nine eighth graders received either multimedia-based instruction that emphasized molecular representations ($n = 16$), or regular instruction ($n = 33$). Students who received multimedia-based instruction that emphasized the molecular state of chemicals outperformed students from the regular instruction group in terms of the resulting test scores and the ease with which they could represent matter at the molecular level. However, results relating to the long-term effects suggested that the effectiveness of a multimedia-based environment can be improved if instruction includes additional prompting that requires students to attend to the correspondence between different representations of the same phenomena.\footnote{Dilek A. and Sevil A. (2002) conducted a study, "Effectiveness of multimedia-based instruction that emphasizes molecular representations on students’ Understanding of chemical change". Journal of Research in Science Teaching, 41: p.317-337.}
Goldberg, A., Russell, M. and Cook, A. (2003) conducted a study on “The effect of computers on student writing: A meta-analysis of studies from 1992-2002”. In this study, the researcher performed a meta-analysis of 26 studies conducted between 1992-2002 that focused on the comparison between pupils’ writing with computers vs. paper-and-pencil. The analysis found significant mean effect sizes in favour of computers in relation to the quantity as well as the quality of the writing. The researchers also found that the writing process was more collaborative, interactive and social in computer classrooms as compared to paper-and-pencil environments, and they included that pupils who use computers when learning to write were not only more engaged and motivated in their writing but also produce written work that was of greater length and higher quality.  

Chang, V. (2004) conducted a study on “The role and effectiveness of e-learning: Key issues in an Industrial context”. The purpose of the study was to identify the role and effectiveness of e-learning and key issues related to its implementation in an industrial context. The above study revealed interesting findings about differences between industrialists and academics regarding factor influencing effective and ineffective e-learning implementation. Both groups have close ideas in identifying factors influencing effective implementations but have some variations in identifying factors influencing ineffective implementations. There was a significant difference between their rationale. Industrialist’s rationale emphasized practical applications, in contrast academics’ rationale emphasizes the literature review and research findings.  

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Cox, M., Abbott, C., Webb, M., Blakeley, B., Beauchamp, T. and Rhodes, V. (2004) conducted a study on “A review of the research literature relating to ICT and attainment”. The study has found positive effects of ICT on pupils’ attainment in almost all the National’ Curriculum subjects, particularly regarding mathematics and English at all key stages. This study further has suggested that a crucial component in the use of ICT within education is the teacher and their pedagogical approaches. The impact on attainment was greatest for those ICT resources that have been integrated in teachers’ practices for a long time. The authors concluded that ICT has a positive impact on pupils’ learning when the use of ICT was closely related to learning objectives and when the choice of how to use ICT was relevant to the teaching and learning purposes.  

Galanouli, D., Murphy, C. and Gardner, J. (2004) conducted a study on “Teachers perceptions of the effectiveness of ICT-competence training”. The aim of the study was to analyse training programmes initialised by a national initiative in the U.K, designed to raise ICT competence development of all U.K. primary and secondary teachers and to foster their positive attitudes to computers. The analysis presented in the study has focused on the teachers’ perspective and called into question the extent to which teachers have made significant progress as a result of the so-called NOF (New Opportunities Fund) training. The findings of the study have shown that the NOF completed group expressed more confidence, but exhibited no significant differences for the pairings of gender, age or school type. A comparison between the means of the subgroups that expressed positive and negative attitudes to NOF training in their free responses showed a significant difference concerning the importance of computers. The negative views expressed by teachers in the free, response items concerned the nature, level and delivery of the training, lack of time, the exploitation of teachers’ own time and expense and the lack of technical and social support and’ good equipment.  


Jones, A. and Scrimshaw, P. (2004) conducted a study on “A review of the research literature on the barriers and enables to the uptake of ICT by teachers” to identify the factors that prevent and facilitate the uptake of ICT by teachers. The study on the barriers has found that: (i) the uptake of ICT is most commonly prevented by lack of confidence, recurring technical faults, and resistance to change; (ii) the uptake of ICT is most frequently facilitated by leadership and planning, sharing of resources, technical support, and schools working with each other and with the local community.  

Ludwig, T.E. and Daniel, D.R (2004) conducted a study, “Using Multimedia In Classroom Presentations: Best Principles”. The purpose of the study was to identify some of the best practices in computer-enhanced classroom instructions. The findings of the study had shown that if done well, multimedia content organized with a slideware tool can generate productive and stimulating presentations that lead to greater retention, application to new situations and performance on assessments. If not done well, they can be a distraction from learning and ultimately unproductive.  

Passey, D., Rogers, C., Machell, J., McHugh, G. and Allaway, D. (2004) conducted a study on “The motivational effect of ICT on pupils” to investigate the effects of ICT on pupils’ motivation. This study has found that ICT positively impacted on motivation, particularly in relation to engagement, research, writing and editing and presentation. Pupils reported that the Internet, interactive whiteboards, writing and publishing software, and presentational software were the most useful. There was also evidence that ICT positively influenced attitudes towards school work and school behaviour.  

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Tuzlukova (2004) in his study “Some cultural and social aspects of educational discourse in E-Medium” reported on some impressions of Russian English Language teachers who took an e-learning course: Integrating Internet into the classroom. The main purpose of the study was to identify socio-cultural factors and personal attributes that influence the decision of Russian learners to take an on-line course and stay enrolled in the programme. The findings showed that the percentage of those who have not started any e-course in the last 3 years is great (74 percent). Nevertheless the dropout percent is low (4 percent). Most of those who started e-learning courses completed them (21 percent). These findings indicate that e-learning programmes have not replaced even partially traditional practices in Russian universities. Most of the respondents answered that their universities were quite new in e-learning programmes. Some started educational programmes with electronic means in 2001, others in 2003 and try to their best to organize them well.\(^8\)

Davis, N. E. and Preston, C. (2007) conducted a study on “Theoretical and Evaluation Frameworks to Inform Technology-Related Professional Development for Teachers, Tested with Evidence from a National Study of ICT Professional Development for Teachers” to re-examine the evidence from a national initiative to train all teachers in England to bring them up to the level of newly qualified teachers who were required to know when to use, and when not to use, Information and Communications Technology (ICT) in their professional practice. Data gathered for the 2004 evaluation of the programme uncovers the complexity of such professional development. Multiple sources of evidence were provided on the professional development. Multiple sources of evidence were provided on the effectiveness of contrasting approaches to ICT-related teacher training. This data was analysed including a national survey of 496 trainees, and experts’ reports on 16 of the 47 training providers was analysed using Guskey’s five levels of Professional development evaluation: participants’ reactions; participants’ learning; organizational support and change; participants’ use of new knowledge and

skills; and, students’ learning outcomes. This first analysis showed Guskey’s levels to be robust for ICT-related teacher training, including a significant correlation between the experts’ views and those of teachers who had undergone training. The evidence confirms the value of an ecological perspective. The most effective training supports change with ICT in macro and micro ecologies, including the classroom, the school, and training provider’s region. ICT-related teacher training using an ‘information transfer’ approach is not appropriate, despite its success in commercial training.\textsuperscript{85}

**Kuzu, A. (2007)** conducted a study on “Need of School Technology Adviser of Primary and Secondary Schools in Turkey”. This study aims to investigate opinions of K-12 teachers and administrators regarding their need for technology counseling services. While evaluating data to realize this aim, following research questions were scrutinized. (1) What are the opinions of K-12 teachers and administrators regarding their need for technology counseling services? (2) Do teachers’ opinion regarding technology counseling services differ with regard to: (a) Educational institution they work at? (b) Gender? (c) Seniority? The reference population of the current study consisted of state K-12 schools in Eskisehir city center. Cluster sampling was realized in order to determine different groups of state schools in city center and four schools were randomly selected from those clusters. A total of 148 school employees participated in the study. According to findings, administrators and teachers agree that: (1) Having an officially employed technology adviser at their institution to ask for assistance in case they need support will be helpful for their institutions technological infrastructure; (2) Having a technology adviser at their institution will help realizing teaching-learning endeavors efficiently; (3) Technology adviser should help employees with their problems and projects regarding computers software programmes and hardware; (4) Technology adviser should receive support from voluntary teachers and students with regard to realizing technological endeavors, and organize teachers and students to realize those endeavors; (5) Technology adviser should organize teacher and student seminars regularly so that they can use technology efficiently; (6) Technology adviser should

contribute to the process of generating organization’s technological infrastructure; (7) Technology adviser should guide teachers in integrating technology into teaching and learning endeavors; (8) Technology adviser should help students and employees of the organization with technology related psychological aspects such as technology frustration, technology anxiety and technology addiction.\(^{86}\)

**Naser-Nick, M. (2007)** conducted a study on “The Influence of Learning Styles on Learners in E-Learning Environments: An Empirical Study”. It has been found that for the instruction-based learning, the learning style was irrelevant, but for the web-based learning class, learning style was significantly important. The results showed that students with learning styles Assimilator and Converger did better with the e-learning method. This means that those learners that like to learn through thinking and watching and thinking and doing would learn better with e-learning. In addition, students with learning styles Accommodator and Diverger received better results with traditional instructor-based learning.\(^{87}\)

**Preston, C. and Cuthell, J. (2007)** conducted a study on “The Perspectives of Professional Educators on ICT CPD: Past, Present, Future” to investigate teacher advisers’ and teacher educators’ professional development needs in ICT with 250 members of the IT specialist groups Naace, ITTE and Miranda Net. They found that around a third of the respondents had received no ICT training for three years and some ten percent had never had any form of formal instruction. Practice-based training, rather than skills-based or academic courses, was deemed most useful by 41%. In terms of motives for using ICT, equipping learners to be independent featured prominently (48%) as did international collaborations (19%). Very few respondents made any link to supporting vocational learning a key strand of the new 14-19 curriculum.\(^{88}\)


**Alodiedat, A.S. and Eyadat, Y. A. (2008)** conducted a study on “Effect of Intranet use on Students’ Achievement and Self-Confidence”. The major objectives of the study were (i) To study the effect of the intranet on AUST students’ achievement and self-confidence. (ii) Are there any significant differences between the control group and experiment group in regard to achievement and self-confidence? The study found that experiment group used the intranet and internet more often than the traditional group. Students in the control group and the experimental group had a positive, high level of confidence in all items. Also, the study found that there was no significant difference in achievement based on the number of hours spent using the intranet and internet; also, there is no significant difference in self-confidence or achievement between male and female students in the control group. In addition, the study found a weak correlation between self-confidence and achievement.\(^8\)

**Mustafa, Bakac., Ashhan, Kartal Tasoglu and Turgay, Akbay. (2010)** conducted a study on “The Effect of Computer Assisted Instruction with Simulation in Science and Physics Activities on the Success of Student: Electric Current”. The major objective of the study was to observe the effect of computer assisted instruction (CAI) with simulation technique used in teaching the subject of “Electric Current” on the successes of students. The study found that, of the two groups whose successes were the same at the beginning, experiment group students on whom CAI method was applied came out more successful than control group on whom traditional method was applied. In addition the study found that CAI technique increases the academic successes of students in the subject of “Electric Current”.\(^9\)

**Mustafa, Ashhan, Turgay, (2011)** conducted a study on “The Effect of Computer Assisted Instruction with Simulation in Science and Physics Activities on the

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Success of Student: Electric Current” The objective of the study was to observe the
effect of computer assisted instruction (CAI) with simulation technique used in teaching
the subject of “Electric Current” on the successes of students. At the end of the study it
was detected that of the two groups whose successes were the same at the beginning,
experiment group students on whom CAI method was applied came out more successful
than control group on whom traditional method was applied. Eurasian Journal of
Physics and Chemistry Education, Jan. (Special Issue):p.34-42

The review of literature throws light on the work done by different
researchers in the area of CAI. Very few studies are related to subject Biology at
senior secondary level and no study has been conducted on ‘Genetics’. Hence the
present study is unique one. It is related with development of CAI based ‘Genetics’
module.

The present review of related literature has helped the investigator in
developing the hypotheses and the right kind of design of the study to be adopted
for the present investigation, which appear in the following chapters. The
researcher made a humble attempt to fill up the described gaps.