CHAPTER-II
REVIEW OF RELATED LITERATURE

2.1. Introduction

In the previous chapter, the investigator discussed in detail the significance of the problem of present investigation, objectives of the study and hypothesis etc., the present chapter is set apart for making a brief review of the related studies. A study of the related literature implies locating, reading and evaluating reports of research as well as reports of casual observation and opinions that are isolated individual planned research project. The present investigation proposed to study status of ICT utilization in secondary schools: practical challenges and future recommendations (a case of north coastal districts in Andhra Pradesh).

A detailed review of the related studies have done to plan the present study, in selecting methodology, research tool, size of sample, sampling technique and statistical techniques used.

Meaning of Review of Literature

The Phrase ‘review of literature’ consists of two words, Review and literature. The word literature conveyed different meaning from the traditional meaning. It is used with reference to the language. Here in research methodology the term literature refers to the knowledge of a particular area of investigation of any discipline which includes theoretical, practical and its research studies.

The term ‘review’ means to organize the knowledge of the specific area of research to evolve on edifice of knowledge to show that this study would be an addition to this field.

According to Good, Bar Scates

“The competent physician must keep abreast of the latest discoveries in the field of medicine. Obviously the careful student of education, the research worker
and investigator should become familiar with location and use of services of educational information”.

**According to John W. Best**

“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 areas of human endeavor”

**According to charter V. Good**

“The keys to the vast store house of published literature may open doors to sources of significant problems and explanatory hypothesis and provide helpful orientation for definition of the problem, background for selection of procedure, and comparative data for interpretation of results. In order to be creative and original, one must read extensively and critically as a stimulus for thinking”.

**Need and importance of Review of literature**

The review of literature is essential due to the following reasons.

- One of the early steps in planning a research work is to review research done previously in the particular area of interest and relevant area. Quantitative and qualitative analysis of this research usually gives the worker an indication of the direction.

- It is very essential for every investigator to be up to date in information about the literature, related to the problem being taken up. It is considered the most important pre-requisite to actual planning and conducting the study.

- It avoid the replication of the study of findings to take advantage from similar or related literature as regards, to methodology, techniques of data collection, procedure adopted and conclusions drawn. Investigator can justify his own endeavor in the field.
➢ It provide sources of problem of study, an analogy may be drawn for identifying and selecting his own problem of research. The researcher formulates hypothesis on the basis of review of literature. It also provides the rationale for the study.

➢ The results and findings of the study can also be discussed at length.

The review of literature indicates the clear picture of the problem to be solved. The scholarship in the field can be developed by reviewing the literature of the field.

**Objectives of Review of literature**

The review of literature serves the following purpose in conducting research work.

- To provide theories, ideas, explanations, or hypothesis which may prove useful in the formulation of new problem.
- To indicate whether the evidence already available, solves the problems adequately without requiring further investigation. It avoids the replication.
- To provide the sources for hypothesis. The researcher can formulate research hypothesis on the basis of available studies.
- To suggest, method, procedure, sources of data and statistical techniques appropriate to the solution of the problem.
- To locate comparative data and findings useful in the interpretation and discussion of results. The conclusions drawn in the related studies may be significantly compared and may be used as the subject for the findings of the study.

2.2. Teacher’s use of ICT

This subtopic covers 20 foreign studies and 12 Indian studies to assess the ICT utilization in various geographical aspects. This sub topic mainly focuses on different areas such as educator’s pedagogy influencing the effective use of computers for teaching purposes, Impact of training and experience in using ICT
by in-service teachers, Impact of ICT diffusion, participatory development of teaching and learning, the effectiveness of using internet as a principal information resource in teaching and learning activity in higher educational institutions, teacher educators’ ICT competencies, usage, and perceptions, Computer based technology and its pedagogical utility, ICT usage in Higher Education, ICT adoption among secondary school teachers, ICT In initial teacher education, Teachers’ incorporation of ICT in classroom teaching, Computer and Internet awareness in school going students, e-Training the future world of education, Utilization of computer technology in remedial instruction and modern ICT trends in teaching technology and other related areas.

Wanjala, Elizabeth. K and Mukwa (2011) found that few teachers are using ICTs to manage the classroom and to integrate technology into several of the content areas. Professional development options were varied. They pointed out the most teachers use trial and error, learn through course work taken at colleges or universities, and support others or receive personal or expert support as significant methods of learning how to use Information Communication Technologies.

Rachmawati and johancynthia (2010) conducted on ICT based learning schools to assess the challenges on implementation. Results indicated that ICT based learning the role of teachers were significantly changed from transferring of knowledge into facilitating of learning, from a main source person to be a manager of learning. Other challenge is also addressed to head teachers in encouraging teachers to implement ICT based learning in order to improve students capability and skills.

Visvanathan (2010) conducted a predictive study on secondary schools to examine the educator’s pedagogy influencing the effective use of computers for teaching purposes in classrooms in South Africa. Results revealed that educator pedagogies were the highest predictors on the use of computers in the classroom. Although the quantitative analyses for educator support, training and attitude were the lowest predictors on the use of computers, the qualitative analysis,
nevertheless, found sufficient support for it. Educationists and policy-makers must include all principals and educators when technological innovations are introduced into schools. All these role-players need to be cognizant of the implications if innovations are not appropriately implemented. Including the use of computers in educator training programs is important so that pre-service educators can see the benefits of using the computer in their own teaching.

**Rosnaini and Ismail (2010)** examined the “Impact of training and experience in using ICT on in-service teachers’ basic ICT literacy”. The study found that majority of the teachers had moderate basic ICT knowledge and skills, and perceived ICT positively. Formal ICT training and ICT experience influence the teachers’ knowledge, skills and attitude. Therefore, teachers especially the older ones and normally with more teaching experience need to be identified, and provided with specially designed training programs, in various forms of ICT courses and workshops.

**Philip, Oluwatolani and Oluwaranti (2010)** did a study on an evaluation of the impact of ICT diffusion in Nigeria higher educational institutions”. They found that ICT is becoming a driving force for educational reforms and those ICTs have become an integrative part of national education policies and plans in Nigerian tertiary institutions.

**Queen (2010)** studied on ICT in participatory development of teaching and learning English as a global language in Nigeria. Results indicated that there is improvement in the quality of language teaching through the diversification of contents, methods, and as well promoting experimentation, innovation and obtaining and sharing of information. There is wide-range of language learning reforms, hence the need to; (I)Increase access to teacher’s knowledge and development through interactive technology (II) Increase the people’s awareness on the importance of technology (III) Increase access to instructional resources, increase flexibility in what to learn, how to learn and when to learn (iv) Train teacher to improve the competence in using the new technologies in the
instructional activities (v) Increase governmental support in technological programmes and funding in the tertiary institutions. (vi) Adherence to these needs will help to realize more positive results in the application of technology in language teaching and learning in Nigeria.

Farahiza (2010) conducted a study on “The effectiveness of using internet as a principal information resource in teaching and learning activity in higher educational institutions in Malaysia”. Majority of the previous researchers indicated that there are significant relation between the internet and the student and also the lecturer in using the internet as a principal information resource in teaching and learning activities. This study showed that internet is a technology that considered brought benefits to the student and lecturer in teaching and learning activities as well as the applications provided by the internet.

Rebecca and Porter (2010) the findings of the study indicated that the strongest predictors that are positively associated with computer use are training on excel and the need for ongoing support for the inclusion of technology in mathematics teaching. This paper concluded with recommendations as to how school leaders can support mathematics teachers to fully adopt computer technology use in teaching and learning.

Yuksel, Soner and Zahide (2009) conducted to examine the “Teacher educators’ ICT competencies, usage, and perceptions”. The data were collected from 111 teachers and interviewing with 6 teachers. The results indicated that most of the participants expressed positive perceptions about the integration of ICT into teacher education programs. Generally, their ICT competency was completely sufficient. They use the Internet as a supportive tool to their courses, and particularly search engines used by them.

Rafeedali (2009) carried out a study on “Computer based technology and its pedagogical utility”. The study revealed that higher secondary school teachers were unable to utilize the opportunities of information technology resources in
education and they were observed to be comfortable with traditional teaching methods and materials and also pointed out secondary school teachers could not use the ICT resources in the classroom interaction. Only 13 percentage of higher secondary school teachers are using power point presentation in the classroom.

**Yasemin (2008)** did a study on “ICT usage in Higher Education: A case study on pre-service teachers and instructors”. Results revealed that teacher education programs fail to provide appropriate instructional technologies and computer facilities for both in and out of class activities. Furthermore, three factors that appear to have a significant influence on the effective use of technology were found to be: (1) the quantity and quality of the lessons addressing technology in the curriculum, (2) incompetent teachers/lack of in-service training, and (3) insufficient technology.

**Boakye and Banini (2008)** conducted a case study approach to assess the Teacher ICT Readiness in Ghana by using a quantitative and qualitative data were gathered to understand the use of ICT in the selected schools. Results obtained were 71% of teachers do not use ICT in classrooms, 49% of teachers use ICT to prepare lesson notes, 55% of teachers have some knowledge of web browsing, 71% use email, and 78% try to make an effort to learn how to use the computer. Despite the limited use of computers by teachers in their teaching, many agree that the computer has changed the way students learn. And 24% of teachers have received some form of training in the use of computers, with quite minimal training in the pedagogical integration of ICT.

**Beethenglau and Chiahuasim (2008)** conducted a study on “Exploring the extent of ICT adoption among secondary school teachers in Malaysia”. They investigated that teachers ICT use in schools, their perceived competency, perception of ICTs and their training and support needs. From the study it appears that most of them are positive with the use of ICT in school, and they appreciate the use of ICT in enhancing teaching and learning. The teachers have positive attitude towards further integration of technology into classroom instruction.
Taner Altun (2007) studied on “ICT in initial teacher education”. These vital factors were; ICT infrastructure and physical resources, curriculum and policy development, training lecturers and pedagogical training of teachers in ICT. ICT has the potential to contribute to the improving of students’ critical thinking, decision making, problem-solving skills and generating ideas with its integration into classroom activities. The teacher’s role at this point is crucial.

Romina, Protector, Paul, Glenn and Watson (2006) found that male teachers report significantly higher levels of confidence in using ICT with students for teaching and learning and the students of male teachers or confident teachers use ICT more frequently to both enhance and transform the curriculum. Further there was no significant relationship between years of teaching experience and teacher confidence but experience did impact on the level of ICT use that teachers prefer their students to demonstrate, with teachers who have had least experience preferring their students to use ICT more to both enhance and transform the curriculum.

Nwachukwu prince (2006) concluded that varieties of techniques are needed for teachers to effectively utilize ICT instructional materials in the teaching and learning process. It was also revealed that there are significant differences in the effectiveness between professionally trained teachers and untrained teachers in their ICT instructional material utilization competencies.

Kin, James and Ian (2005) have done a study enhancing teachers’ incorporation of ICT in classroom teaching. This study focused on determining the effectiveness of a school-based, on-site, and ongoing professional development program conducted in a primary school in Hong Kong. There were training sessions conducted by fellow teachers, and participatory action research groups to share resources and experience in incorporating ICT in teaching. Teachers’ incorporation of computers in teaching was significantly increased in the first year
of intervention but showed fluctuation in the second year. A number of explanations were offered by teachers in their interviews for these changes.

Debra and Hayes (2005) focused on ICT and learning: Lessons from Australian classrooms. Results revealed that ICT is largely being integrated in ways that support and supplement existing classroom practices. The results are often unsatisfying for both teachers and students because of the limited availability and varying functionality of ICT. These conditions suggest that teachers need support to develop new approaches to teaching and greater access to reliable technology before the powerful ICT learning environments that have been heralded are realized.

Mary (2002) conducted a study to examine the Pedagogical reasoning: Issues and solutions for the teaching and learning of ICT in secondary schools. It is cleared from the analysis of the pedagogical reasoning process in relation to teaching ICT that the lack of ICT content knowledge of some ICT teachers is only a small part of the problem. The other categories of knowledge where deficiencies have been identified; pedagogical content knowledge, subject specific aspects of general pedagogical knowledge, knowledge of learners and curriculum knowledge, will require an extensive collaborative effort involving teachers and researchers.

Guoyuan, Martin, Johan, Jo and Chang (2009) conducted a survey on 820 Chinese primary school teachers by using path modeling to assess the direct and indirect effects of the teacher related variables on their level of classroom ICT integration. The results were shown that classroom use of ICT directly depends on teachers’ computer motivation and the supportive use of ICT. Teachers’ constructivist beliefs, their attitudes towards computers in education and perceptions about the ICT-related school policy influence ICT integration in an indirect way. The results were demonstrated that how the complex interplay between teachers related variables and ICT integration in the classroom is partly in line with findings in non-Asian contexts. A number of differences can be explained by the particular Chinese context. In particular an indirect relationship
was found between teachers’ constructivist beliefs and their level of ICT integration. This is partly be explained by the Chinese educational tradition, based on the Confucian philosophy emphasizing “a group-based, teacher-dominated, and centrally organized pedagogical culture”

**Indian Studies**

**Rajakumaran, Soureche and Viswanathan (2010)** examined a study to assess the “Role of ICT in teaching and learning Mathematics”. It was found that ICT enable the students to manipulate diagrams dynamically and it encouraged them to visualize the geometry as they generate their own mental images. It is also enhanced opportunity for students to be introduced to interesting problems and associated mathematical subject matter much earlier than before possible.

**Neeraj and Anitha (2010)** did a study on “Computer and Internet awareness in school going students”. The study found that the required level of awareness about computer and the internet is not there. The real power of the computer is revealed in the internet. But the penetration of computer and internet is still far from desired.

**Krishnaveni and Meenakumari (2010)** focused on “Usage of ICT for information administration in higher education institutions”. Results revealed that a comprehensive set of functional areas of information administration. It was found that current level of usage indicated a clear integration of ICT for managerial or information based administration in higher education institutions. Enhancing the usage of ICT on these functional areas and especially for general administration will enable enhancement of overall information administration in higher education institutions of global environment. It is serving as a base for education planers to deploy technology based administration in higher education institutions.

**Antony Gracious,(2009)** studied on “e-Training the future world of education”. The results were revealed that e-training was very easier, faster,
reduces the distance and is much sophisticated. So the experts can present their e-resources, e-lectures through online and the learners listeners can learn it by visualizing from their places as well as interact through video conferencing and share the resources through email immediately. This study suggested that there is no doubt, ICT and its components will replace the future teacher education and in-service programs with e-training.

**Anil Ambasana (2009)** conducted a research on “Utilization of computer technology in remedial instruction”. Results concluded that computer – assisted instruction programme in remediation task was found to be successful as the students were able to overcome the difficult points in the content. Hence they were able to increase their achievement significantly. Utilization of computer technology in remedial instruction was found effective.

**Kmaleyan (2008)** designed a study on “Implications of Information Technology for teacher education and research”. It was pointed out that information technology in education is created the need for all teacher education faculties to be proficient in the use and integration of ICT into mainstream teacher education programme delivery.

**Nimavathi and Gnanadevan (2008)** did a research to examine on “Effectiveness of Multimedia programme in teaching science”. Results were found that multimedia programme prepared by the researcher is more effective for the achievement in science of ninth standard students. The students learning through multimedia programme are found to be better than the students learning through the conventional method of teaching.

**Nachimathu and Vijayakumari (2007)** did research on “Modern ICT trends in teaching technology”. They pointed out most of the teacher educators are not able to use the media technologies due to lack of training. He suggested that the teachers have to be equipped with the skills and abilities from time to time to
handle the latest technology as the quality and competence of teachers affect instruction with a strong impact on student learning.

**Thillaka and Pramilla (2000)** conducted and experimented quantitative method to examine the influence of computer-based multimedia programme on achievement in maths among high school students and to find out the difference in achievement in maths between high achievers and low achievers from both relative retention of learning in mathematics. A Sample of 62 was collected from IX Class students. It was observed from the results that 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.

**Kumar (1998)** designed an experimental study to examine the relative effectiveness of three methods of instruction, exposition method and programmed Learning. The results found that (i) the multimedia method was more effective than either the programmed learning method or the expository method. (ii) The programmed learning method was more effective than the expository method. (iii) Retention in learning by the multimedia method was higher than by the other two methods. (iv) Retention in learning by the programmed learning group and the expository group was equal. (v) There was no interaction between the three methods of instruction and the levels of intelligence.

**Desai (1985)** investigated into efficacy of different instructional media in the teaching of science to the pupils of class 8th in relation to certain variables. The major findings of the study were (i) the programmed learning approach was more effective than the traditional way of teaching science. (ii) The experimental
approach was more effective than the traditional way of teaching science. (iii) The use of instructional media indicated the possibility of improvement in the methodology of science teaching, raising the standard of science education in secondary schools and development of taste and interest in the younger generation for the subject of science.

Vardhini (1983) conducted an experiment to test the developed multimedia verses instructional strategy for teaching science at secondary level. The experiment was conducted for an academic year to cover 19 units of the subjects chosen for study. Results revealed that (i) almost all the units indicated average and high level of performance of the total test. (ii) The strategy was found valid against the criterion of scientific attitude in that significantly higher performance was noted for the group in the post test over the pre test. (iii) Validity of the strategy was established from reactions expressed by students for its continuance and also their improvement in science achievement. (iv) Programmed material and discussion sequence were equally effective on the total test. (v) The strategy was found feasible when seen in terms of its reproducibility and the cost management by individual’s schools.

2.3. Barriers and Supporting Features of ICT

This subtopic covers 8 foreign and 6 Indian studies to review the supporting and relevant studies regarding barriers and supporting feature. This study mainly focused on teachers influence on class room, main barriers and possible enablers of ICT integration, interplay of institutional forces behind higher ICT education, use and need of secondary and higher secondary and other related areas.

MaimunAqshalubis, Abdullah, Melor, Noriah and Tajularifin (2011) examined to know the Use of ICT in Teaching Islamic Subjects in Brunei Darussalam. Results revealed that Bruneian teachers” use of ICT in teaching is influenced by personal, social and control factors. Firstly, the personal factors that
validly and reliability indicate teachers” attitudes towards the use of ICT in teaching are their liking, enjoying and feeling comfortable during teaching when using ICT. Secondly, the social factors or subjective norms that influence teachers” use of ICT are principal and head of department (HOD). Finally, the control factors that influence teachers to use ICT are their capability and having the resources, the knowledge and skills to use ICT effectively and successfully.

**Hennessy, Harrison, and Womakote (2010)** focused on “Teacher factors influencing classroom use of ICT in Sub-Saharan Africa”. Results revealed that a need for teachers and teacher educators to integrate ICT into subject teaching and learning is using contemporary pedagogical approaches. They conclude that by drawing out a number of pedagogical implications for initial teacher education and professional development to bring schooling within developing contexts into the 21st century.

**Afshari, Abubakar, Wong, Abusamah and Foosayfooi (2009)** carried out a study on “Factors affecting teachers use of ICT”. Results were found that ICT implementation in schools show that there are two main factors that affects teachers uptake of ICT. These are manipulative and non – manipulative, school and teacher factors. Research on the implementation of ICT in schools has also shown that these school and teacher factors are interrelated. The success of the implementation of ICT is not dependent of the availability or absence of one individual factor, but is determined through a dynamic process involving a set of interrelated factors. Teacher education institutions and programmes must help teachers to understand now the new technologies can best be used in the context of the culture, needs, and economic conditions of their country.

**Khalid Abdullah (2009)** conducted a study on “Barriers to the successful integration of ICT in teaching and learning environments”. The study found that teachers have a strong desire for the integration of ICT into education but that they encountered many barriers to it. The major barriers were lack of confidence, lack
of competence, and lack of access to resources. Since confidence, competence and accessibility have been found to be critical components for technology integration in schools, ICT resources including software and hardware, effective professional development, sufficient time, and technical support need to be provided for teachers.

Yuksel, Soner and Zahide (2009) studied on “Main barriers and possible enablers of ICT integration into pre-service teacher education programs”. Results are obtained that the majority of the stake-holders believe that lack of in-service training, lack of appropriate software and materials and lack of hardware are the main barriers for integrating ICTs in pre-service teacher education programs.

Jefpeeraer and Peter Vanpetegem (2008) carried out a study on “Factors influencing integration of ICT in higher education in Vietnam”. It was observed from the results that internal factors like attitude towards computers and conceptions of student learning as construction of knowledge do not significantly influence the use of ICT applications for teaching practice. It is clear that Vietnamese teacher educators are very much aware of the potentials of ICT and they are open for constructivist approaches of teaching and learning.

YuLi Chen (2008) focused a study to examine the “Factors affecting the integration of Information and Communications Technology in teaching English in Taiwan”. This study revealed that only when we begin to provide effective continuing professional development, will be able to expect fruitful realization of the potential of ICT to improve the quality of learning at higher education institutions. Accordingly, Taiwanese educational leaders and policy makers should develop long-term and adequate funding for ICT integration instruction, including ongoing professional development for teachers. Higher education institutions in Taiwan should place emphasis more on technology integration in the classroom than in distance learning. Administrators should try to understand and meet the needs of language teachers so that they can provide necessary and appropriate
support for language instruction. They need to efficiently and carefully consider budget for essential expenditure on hardware and software.

**Shazia Mumtaz (2000)** conducted a study on “Factors affecting teachers use of Information and Communication Technology”. This study found that successful implementation of ICT needs to address three interlocking frameworks for change, the teacher, the school, and policy makers.

**Indian Studies**

**Prabir, Sahu and Afzal (2011)** studied on “Right to Education: effective use of ICT for reaching out to socially and economically weaker sections in India”. This study revealed that most of the enrollment in the coming several decades will be in developing countries and India will contribute a significant proportion of that expansion. India by enacting right to education act, 2009 has set out on an ambitious path to provide free and compulsory education to all children in the 6 to 14 age groups. As a result the number of students enrolled in elementary schools in far flung villages would definitely see a quantum jump. Challenges of funding, availability of qualified teachers, and building a sustainable academic culture and school infrastructure are significant and real. Providing access to the free education for the children of downtrodden peoples like tribal lower castes, and dalits is a complex issue in India wherein the fragmentation in the society along religious, ethnic and linguistic lines is deep rooted. In addition, rampant poverty which is the root cause of child labour leaves no time for the affected children to undertake formal schooling. We also explore the ways in which the strengths of ICT can be averaged in achievement of the goal.

**Nachimuthu (2010)** conducted a study on Usability of e-learning resources in teacher education of India. Results study revealed that all the institutions are having at least five computer peripherals with 70 percent Air conditioned facilities in their ICT laboratories. Majority of B. Ed college lecturers and their colloquies are already taking actions regarding some the accepted ways of use of computers in their regular classrooms (32.0), however, they are not prepared to sacrifice their
personal comfort for using e-books (in total 45%), they have strong reasons for that. the College of Education lectures were using the physical books handling (86.2) rather than the e-books are also evidenced that, they were either not having enough time to use e-books or entry in the computer labs. This paper offers a critical examination of e-Learning in the College of education institutions setting. In order to create more teachers professional development and to enhance the research experience we need in e-journals and e-books.

Sanjaya (2007) carried a study on the e-learning bandwagon: Politics, Policies and Pedagogy. This study showed that e-learning in India is still at an infant stage, in spite of the tremendous developments in the IT sector. The poor access to technology demands building of ‘digital bridges’ to support student learning, and emergence of a range of communities of practice that thrive on the World Wide Web and support their own life long learning needs. This is a tall order, but not a difficult task. The community of distance educators is predisposed to use of e-learning, and embrace it into their teaching and learning. However, what is required is adequate support at the level of policy, technology access and training of teachers. To boost the systematic development of e-learning in India the following steps are recommended for consideration: Establishment of Indian Council for Online Learning (ICOL) as a statutory Body to :(I) Maintain standard of Online Learning Coordinate and promote Online Learning;. (ii) Establishment of a “e-learning Consortium” including member educational institutions to offer e-learning programmes without duplicating efforts;(iii) Develop facilities for online training of teachers; and (iv) Facilitate development of small re-usuable learning objects by teachers through a sharable web portal.

Jonathan (2005) carried out a study on to examine the interplay of institutional forces behind higher ICT education in India. This study was observed three main empirical findings that is 1. Technology related higher education in India is clearly focused on the global economy and it is worthwhile to note –the American led global economy. There is a tremendous reverence for western specifically American standards and forms of knowledge. 2. An exception of this
reverence that stands out is that Indian curriculum is overwhelmingly technical, to the detriment of the social sciences which clearly have second class status. The footprint of industry is quite large, reflected in the attitudes of academics and in the formal curriculum development process.

Maria Athaide (2005) focused to examine the effectiveness of the training program conducted by Intel- India for secondary school teachers. The study has come out with meaningful finding as follows: (i) A large majority of the Principals and teachers were found to have high level of satisfaction with respect to Intel training to teachers on MS Word and MS Power Point, whereas, the level of satisfaction with respect to the MS Publisher was found relatively low. (ii) SSC teachers were found to have higher level of satisfaction than that of the ICSE and CBSE. (iii) Teachers having Teaching Experience >10 years & <20 years were found to higher level of satisfaction than those having <5 years, >5 years & <10 years, and >20 years. (iv) Teachers having Teaching Experience <5 years were found to higher level of application of Intel’s Training Program than those having <5 years, >5 years & <10 years, >10 years & <20 and >20 years teaching experience. The barriers that prevent the use of computers as a teaching tool have been reported by the study as follows: (i) Lack of time.(ii) Unavailability of computers/computer lab.(iii) Classes too large to handle in small computer labs.(iv) Not having a PC at home.(v) Teachers overloaded with other work. (vi)Lack of skill and speed in typing.(vii) No specific period allotted for teaching with computers.(viii) Lack of technical knowledge and dependence on technician.(ix) Absence of LAN and Internet connection.(x) Students have better knowledge and skills of computers.(i) there is a positive association between the total satisfaction of secondary school teachers and Intel’s Training Program and its total application.(ii)The Intel Training Program was not specifically related to the curriculum of the three types of schools that were investigated in this study. It was found one of the impeding factors in the integration of technology in teaching.(iii)The beginner’s course was found wanting. The study reports that the duration and content of the Beginner’s Course need to be revised. (iv) A good
infrastructure and well equipped computer lab does not necessarily ensure successful integration and adoption of computer technology. The investigator has given some meaningful benchmarks based on the grounded theory of research to strengthen the Intel training program and some valuable recommendations for integration of technology at the functional level

Iran Shah, (2005) did a study on “ICT awareness, use and need of secondary and higher secondary teachers of English medium schools of vadodara city”. 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. It was found that 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 variables related with the ICT need of teachers were the degree program which they attended at the university level.

2.4. Feeling towards use of ICT

This subtopic coated 5 foreign and 9 Indian studies to assess the supporting and relevant studies with regards feeling towards ICT. This study mainly aimed on following areas such as; Teachers attitudes and levels of technology use in classroom, ICT attitudinal characteristics and use level, Gender differences in attitude towards information technology, school teacher’s attitude towards ICT, Usage of Internet: Practices and attitudes of teacher trainees, Attitude of Postgraduate students towards Internet, Knowledge of Information and Communication Technology (ICT) and attitude towards teaching ICT among teacher educators, Attitude of secondary school students towards computer assisted learning, Attitude towards computer education of the B. Ed and other related fields.
Al-zaidiyen, LeongLaimei and Fongsoonfook (2010) focused studied on “Teachers attitudes and levels of technology use in classroom”. The study concluded that teachers had a low level of ICT use for educational purpose, teachers hold positive attitudes towards the use of ICT and a significant positive correlation between teachers level of ICT use and their attitudes towards ICT was found. They suggested that ICTs use for educational purposes should be given greater consideration than it currently receives.

Iwona and Ewa (2010) were pointed a positive attitude towards computers and ICT among the participating girls. It was also reported a relatively high level of interest in ICT and rather high level of self – efficacy in computing skills. Another finding revealed that girls in earlier year levels were more likely to consider an ICT career than their older peers and that exposure to greater variety of different software tools and services increased students’ interest in an ICT career.

Philip (2008) examined on ICT attitudinal characteristics and use level of Nigerian teachers. Results revealed that ICT use level of teachers was significantly related with each and the combination of attitude constructs. The findings also revealed that perceived control factor, behavioral factors and defense factors contributed mostly to the prediction of ICT use level of teachers. A major finding of the study is that ICT use level and each of the attitudinal constructs are significantly related. Particularly, the study determined that behavioral factor and perceived control factor have the strongest relationship. The usefulness of technology is now universally acknowledged, thus perceived usefulness does not discriminate among today’s technology users. The reason why perceived ease of use does not predict use level among teachers is not immediately apparent.

Wong and Alan (2007) conducted a study among Malaysian student teachers to assess the “Gender differences in attitude towards information technology”. Results were found that gender does not have an impact on the attitudes of female nor male student teachers towards information technology when the same amount of exposure is given to both groups. There was also a
significant difference is the aversion and usefulness dimensions for both genders at the end of course, an indication that the course played a role towards improving the attitudinal measurement in these two dimensions.

**Yusuf and Onasanya (2004)** studied on ICT and teaching in tertiary institutions. Results were found that ICT offer innumerable benefits in enriching the quality and quantity of learning in universities. Despite the prevalent nature of ICT in virtually every aspect of human endeavors, they have not been widely integrated into the teaching and learning process in schools. Their integration will not only revolutionize teaching in tertiary institutions, they will engender the development of students' innate scientific inquiry mind and their critical thinking abilities.

**Indian Studies**

**Vandana and Newa (2009)** conducted to examine the “School teacher’s attitude towards ICT”. The main findings of the study were that private and secondary school teachers exhibited comparable attitude towards ICT. Teaching belonging to different academic streams, viz, language, science, mathematics and social sciences exhibited comparable attitude towards ICT. They found the school teachers exhibited positive attitude towards ICT. Therefore ICT must be given higher priority in teacher education curriculum. So that the future teachers can cope with various challenges in education system, more specifically the new roles of teachers in ICT based teaching learning system. Also in-service teachers must be given training to teach in ICT based instructional settings.

**Helen Joy (2007)** conducted a study on “Usage of Internet: Practices and attitudes of teacher trainees”. Results revealed that the study points to the need for having more refreshers or training programs for teachers to get familiar with computer. It was found that those who had more access to the computer having more favorable attitude towards using the computer also points to the same. Computer assisted instruction and evaluation using computer related technology is widespread, and has been introduced in the evaluation of students at the tenth
standard level and teachers without favorable attitude towards CAI may pose a problem in the effective implementation of the program at the school level.

Neelam and Sushanta Kumar (2007) focussed on “Attitude of Postgraduate Students towards Internet. The results found that (i) postgraduate students have more favorable attitude towards the Internet. (ii) There is no significant difference between the attitude of male and female postgraduate students towards the Internet. (iii) There is no significant difference between the attitude of rural and urban postgraduate students towards the Internet. (iv) There is no significant difference between the attitude of Arts and Science postgraduate students towards the Internet. (v) There is no significant difference between the attitude of Science and Commerce postgraduate students towards the Internet. (vi) There is no significant difference between the attitude of Arts and Commerce postgraduate students towards the Internet.

Sheela (2006) examined on “Knowledge of Information and Communication Technology (ICT) and attitude towards teaching ICT among teacher educators”. The major findings of the study were (i) Teacher educators possessing good and poor knowledge of ICT differ in their attitude towards teaching ICT; teacher educators with good knowledge of ICT have more favorable attitude towards teaching ICT. (ii) Male and Female teacher educators do not differ significantly in their attitude towards teaching ICT. (iii) Teacher educators from private aided and private unaided colleges differ significantly in their attitude towards teaching ICT: teacher educators from private unaided colleges were found to have more favorable attitude towards teaching ICT. (iv) A significant difference was found in the attitude of high experienced and less experienced teacher educators towards teaching ICT: teacher educators with less experience had more favorable attitude towards teaching roof than teacher educators with more experience. (v) No significant difference was found in two attitude scores of teacher educators of arts and science streams towards teaching ICT. (vi) Teacher educators from rural and urban areas did not differ significantly in their attitude towards teaching of ICT.
Nagappa and Shahapur (2005) examined the “Study of attitude of secondary school students towards computer assisted learning. Boys of aided schools have a more favorable attitude towards CAL than boys of government schools. The major findings of the study were (i) Girls of aided schools differ in attitude towards CAL from girls of government schools. (ii) There are significant differences between boys and girls student’s of aided schools in respect of their attitude towards CAL. (iii) No significant difference is found between the boys and girls of government schools in respect of their attitude.

Nirmala Sundararaj (2005) conducted to assess the “Attitude towards Computer Education of the B.Ed. trainees of Tamil Nadu Open University. It was found from the results that (i) there is significant difference between male and female B.Ed. trainees in their attitude towards computer education. That is the female B.Ed. trainees are better than the male trainees. (ii) There is significant difference between rural and urban B.Ed. trainees in their attitude towards computer education. That is the urban B.Ed trainees have better attitude towards computer education than the rural trainees. (iii) There is significant difference between arts and science B.Ed. trainees in their attitude towards computer education.

Regina, Grozman and Ticzon (2004) conducted a survey on teachers to determine the incidence of technophobia and the attitude of teachers towards online learning and teaching technologies. The study revealed that public school teachers are generally more afraid of computers than their peers working in private schools. Older teachers were more afraid of technology than younger ones. But, on the whole teachers had positive attitude towards online teaching and learning technologies.

Anjali (1999) examined to know the developing computer software for learning chemistry at standard IX. This study found that 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 favorable opinion towards
the software package. There was found an interaction effect of IQ, motivation and opinion of students on their academic achievement.

**Munther Mohammed (1999)** focused on Development of Computer Assisted English language teaching for VIII standard students. It was found 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 positive attitude towards Computer Assisted English language instruction.

### 2.5. Policy and ICT

This sub topic covers 2 foreign studies and 7 Indian studies to evaluate the ICT policies in utilization of ICT. This is mostly focused on following areas such as; provision of ICT equipment to secondary schools, Policy networks and the transformation of secondary education, The 11th Plan provides an opportunity to restructure policies to achieve a new vision of growth, Relative effectiveness among different strategies of computer mediated multimedia presentation in teaching and learning of chemistry at higher secondary stage, Effectiveness of Branching Variety of Programmed Instructional Material (PLM) as diagnostic and remedial tool in chemistry, Effectiveness of the school broadcast programmes of All India Radio (AIR) and Educational Television (ETV) Programmes of Doordarshan, Effectiveness of Programmed Learning and Learning through Audio Visual Aids.

**Adeyemi and Olaleye (2010)** found that the level of provision of ICT equipment to secondary schools in the state was low. The level principal’s management of schools was also low. The intermittent disruption of electricity and inadequate funding were found as major problem inhibiting the usage of ICT equipment for the management of schools in the state. Study concluded that the
state government was not fully ready to imbibe (ICT) for the effective management of secondary schools in the state.

Chijioke (2007) focused on Policy networks and the transformation of secondary education through ICTs in Africa: The prospects and challenges of the e-schools initiative. This study revealed that a responsive ICT in education policy in each country is key to the success of school projects across Africa. At the organizational level, the study argues that sustained technology intervention is based more on the resolve of the partner members, especially the political will of African governments. Besides, the e-school initiative stands to gain from the experience of developing countries that have successfully integrated ICTs in education through collaborative strategies.

Indian Studies

Guilherme (2010) studied on using technology for education. ‘The 11th Plan provides an opportunity to restructure policies to achieve a new vision of growth that will be much more broad based and inclusive, bringing about a faster reduction in poverty and helping bridge the divides that are currently the focus of so much attention. While it recognizes that ‘Information and Communication Technology (ICT) has a great potential for enhancing learning levels and improving quality of education’, managing this professionally, with help of the private sector engaged in education, may make the difference between rhetoric and the achievement of desired results.

Bhuvaneshwari (2004) designed methods of Quasi-experimental design, qualitative and quantitative approaches to know the effectiveness of the Computer Assisted valuation package deployed in Internet and Intranet as measured by Tamil nadu professional courses entrance examination. The sample was taken 225 Maths students, 219 Physics students, 219 Chemistry students, 108 Biology students studying in Class XII from Tamil Nadu selected through probability sample technique for the study. The results were obtained: (1) there was significant difference among the different instructional strategies, viz. internet, and intranet with feedback from teachers along with long-term and short term in entrance
coaching programme. (2) There was significant difference in the performance of the students under the different instructional strategies in achieving mastery in subjects Mathematics, Physics and Chemistry. (3) Self-evaluation did not result in mastery with regard to subjects, viz. Mathematics, Physics, Chemistry and Biology. The study cites one hundred thirteen references

Malliga (2003) conducted on Relative effectiveness among different strategies of Computer Mediated Multimedia presentation in teaching and learning of chemistry at higher secondary stage. 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. It was observed from the findings: (1) It is concluded that Interactive Individualizing Learning supported by Multi Media Presentation (IILMMP) was found to be the most effective strategy among all the three different instructional strategies, viz. PBL, IMLMP and IILMMP in term of cognitive skills such as knowledge, understanding and application in realizing 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 no identical 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 realization of instructional objectives. One hundred two references were cited in the study.

Solachi (2003) conducted a survey method by collecting the data from 29 DIETs. 10 Principals, 110 Lecturers, 400 E Teachers to examine the of training technology in DIETs in Tamil Nadu Findings: (1) Valid model and technology lab were available in the DIETs. The in-service programme of DIET had inadequate
infrastructure, less constraints teaching. One hundred thirty references were cited in the study.

**Jyoti (2001)** examined on the Effectiveness of Branching Variety of Programmed Instructional Material (PLM) as diagnostic and remedial tool in chemistry for secondary classes in Jabalpur Division. This study revealed that (i). The achievement of the experimental group was found significantly greater than the achievement of the control group. (ii) The achievement of the urban girls through PLM was found significantly higher than that of the urban boys. (iii). 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. (IV). 135 boys out of 180 and 64 girls out of 99 wanted to continue the study with the PLM on both the topics. (v) The weakness of individual students were diagnosed and removed when branched frames on both the topics were administered.

**Yashobanta (2000)** carried a 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. This study showed that (i). Both the ETV and School Broadcast programmes have been found to have positive effect on school achievement of pupils. (ii). There have been found mixed reactions of students and teachers regarding contents and presentation of the ETV and School Broadcast Programmes. (iii). 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.

**Thatte (1998)** did an experimental study to know 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 revealed that (i) A.V 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. (ii).
Programmed Instruction Method was found to be significantly more effective than the Traditional Method in terms of achievement at Std. V, VI, and VII. (iii) 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. (iv) 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.

2.6. Future Education and ICT

This sub theme covered 6 foreign studies and 6 Indian studies to review the relevant and supporting studies regarding ICT and future education. This theme mainly aimed at the following aspects; that is the Role of ICT in shaping the future of Pakistani Higher education system, oneself-concept, computer anxiety, gender and attitude towards interactive computer technologies, application of Information and Communication Technology, ICT to develop teachers Global Awareness, Using ICT to prepare learners for the 21\textsuperscript{st} Century, Peoples perception concerning the implementation of ICT in the classroom, ICTs for the broader development of India, information technology to face the challenges in today’s education and other related areas.

Zaffar and Shakeel (2011) did a research on “Role of ICT in shaping the future of Pakistani Higher education system”. Results were found that currently ICT is widely used in Pakistan big city higher educational institutions those in Karachi, Lahore, Peshawar, Islamabad etc. but when their use is measured throughout the whole country. This study also found that 50 percentage use when compared with near future or developed countries. And also observed that major causes of the low standard of higher education as suggested in this study are poor or uneven distribution of ICT resources and infrastructure, high ICT expenditures and lack of money, poor of robust ICT policy.
Olaoluwakotansibe Agbatogun (2010) conducted a predict study on 454 Nigerian teachers to assess oneself-concept, computer anxiety, gender and attitude towards interactive computer technologies. Results were revealed that the combination of the three independent variables significantly predicted the independent variable. Gender did not make any significant contribution to the prediction of the dependent variable. Recommendations were made based on findings.

Ajayi and Haastrup (2009) aimed to examine the in Nigerian secondary schools. Results revealed that ICT facilities were lacking in schools, teachers and students were to a little extent exposed to the use of ICT. Moreover, the study revealed the perceived benefits of using ICT in schools which include making teaching-learning interesting; helping the distance learning program; helping teachers to be up-to-date; enhancing quality of work by both the teachers and the students. However, despite these perceived benefits, the study also revealed some of the challenges facing ICT in secondary schools as: irregular power supply: inadequate computer literate teachers; high cost of purchasing computers in schools; inadequate facilities to support full application of the ICT and lack of fund. It was therefore recommended that government should increase the funding of the education sector. There should also be periodic training for teachers on computer and ICT skills acquisition.

Shiang, Sarah, Hui-yinhsu, and Mengping (2008) designed a study on “ICT to develop teacher’s global awareness”. It was pointed out globalization an inevitable trend everywhere in the world, is an idea that must be practiced and implemented in the 21st century classroom. With the assistance of online technologies global connections are possible and indeed necessary. It is expected that more organizations will create connections with different countries in the future. The major contribution of this study has two fold. Provided a model for ICT based instructional activities to improve participants’ knowledge and willingness to use ICT and developed and tested a model to use ICTs to facilitate participants’ understandings and beliefs about global awareness.
Jianwei Zhang (2004) carried out a study on “Using ICT to prepare learners for the 21st Century”. This study revealed that (1) these technology supported innovations had a limited impact on the curriculum. Only 18% of the 174 cases reported a change in curriculum goals or content that was supported by technology; (2) these innovations had limited impact elsewhere. While 75% of the innovations had been used for at least a year, only 41% provided evidence that the innovation had been disseminated to other classrooms or schools; and (3) it is difficult to disseminate even successful innovations. This process of transfer is dependent on such factors as adequate infrastructure and resources, relevance to the new setting, teacher perceptions of the value of the innovation, and plans and policies that encourage the transfer of the innovation. It is the fact that expository teaching approach is still dominating the practices in classrooms in Eastern countries at present. Since open inquiries and collaborations as well as ICT applications entails the profound changes in student-teacher relationships, they are often perceived by teachers as the threats to the order and disciplines in classrooms, and as challenges to an individual's world view.

2.7. ICT and Teaching subject

Olteanu, Dumitrescu, Gorghiu and Gorghu. (2007) studied on “People perception concerning the implementation of ICT in the classroom”. Results found that easier understanding of the content due to the using of ICT, and increasing the fastness and attractiveness of the teaching modalities which combine the ICT with traditional methods. Some teachers found it was also good opportunity to discuss with another teacher on how they can improve their teaching methods. They pointed that the use of ICT in the teaching process of mathematics, computer science, physics, chemistry, history leads to an important increasing of pupil motivation.
Indian Studies

Geoff Walsham (2010) examined on ICTs for the broader development of India. Results revealed that many ICT-based initiatives have taken place over the last decade and some positive effects have resulted. However, the beneficiaries are almost always not the poorest or most disadvantaged groups, it is hard to scale up initiatives to have effects throughout India, and the need for attitudinal and institutional change remains a fundamental problem. It is argued that ICTs should not be seen as ‘silver bullets’ for development but neither are they irrelevant. Rather, they are potentially important contributors towards development in India but only through their integration in wider socio-technical interventions.

Arora (2007) carried a study on The ICT laboratory: Analysis of computers in public high schools in rural India, Journal and Association for the Advancement of Computing in Education. Results found that most of the high schools were created within the last few years in Kuppam. They were surprisingly not only functional but also managed to keep attendance rates high and drop out rates low. Also, having met some excellent and dedicated teachers within the public school system, it was apparent that leadership within this sector was a real possibility. Nor can we consider the ICT efforts completely wasted on these schools; there was a sense of pride created and interest generated among the teachers and students for gaining these privileges. Overall, at least in kuppam, transformation was not just a concept or a subtle layer but a tangible reality. However, to sustain this, continued support is needed from the public and private sector.

Singaravelu and Muthukrishna, (2007) focused on the learning activities to be performed in the traditional learning by exploiting the modern ICT and dwells on the feasible learning activities in the domain of ICT in order to better and further the e-communication learning outcomes of the students in education in general and higher education in particular. This study concluded that Information and Communication Technology is uniquely placed to generate the quality in higher education. The full benefit of technology in the educational process is realized only by enhancing the technology skill of faculty and students, ensuring
adequate system support and providing the funds necessary to build a new academic framework around the new resource. Available resources can be utilized and implemented in the research work to promote the teamwork, global consciousness, self paced learning, self learning, problem solving and cognitive process.

**Chenna Reddy (2006)** conducted study to assess the “Information Technology to face the challenges in today’s education”. The results obtained that computers are revolutionizing all fields of activity today with the need for data ware housing, data analysis, decision making and presentation becoming an important aspect of modern living, the author states that the transformation in higher education needs to utilize the tools of information technology that have become available

**Subbaiah (2005)** did a research on Application of ICT in English Language Teacher Education. A method with normative survey technique and experimental were used. The sample was taken 29 District Institutes of Education and Training from Tamil Nadu, 71 English teacher, educators and 200 teacher trainees by using (1) Questionnaire, (2) Attitude scale, (3) Interviews, (4) Diary analysis used for data collection. The results were found that (1) Sixty-six per cent of teacher educators do not know the basic principles of computer. (2) It is unfortunate that the ICT practices have not seen the widespread application for teacher education. (3) Attitude of teacher educators towards ICT is quite positive. (4) It reveals that the focus of computer equipment problem had both quantity problem (not enough computers) as well as quality problem. Seventy-two references were cited in the study.

**Meera (2000)** designed a Quasi-experimental method as well as qualitative and quantitative approach to examine the study on “Relative effectiveness among different modes of Computer-based Instruction in relation to students’ personality traits. The sample was taken four groups of each having 35 students selected through probability sampling method. It was observed from the results that: (1)
Different modes of Computer based Instruction, viz. Drill, Practice and Simulation were more effective than conventional lecture method in realizing the instructional objectives in Biology at Class XI. (2) Effectiveness of the conventional lecture method and the different modes of the Computer-based Instruction, viz. Tutorial, Drill and Practice and Simulation were not influenced by the learner’s personality. (3) There was significant difference among the different modes of CBI (Computer-based Instruction), viz. Tutorial, Drill and Practice and Simulation in terms of their effectiveness in enhancing the retention of cognition as revealed by the learner’s performance in the retention test. There was significant difference among the different modes of Computer-based Instruction in enhancing retention of what have already learnt. Seventy five references were included in the study.

2.8. Integration of ICT in Teaching

The sub theme of ICT integration in teaching covered 12 foreign studies and 7 Indian studies. This reviews mainly focused on following areas such as; the Perceptions of Students, Teachers, and Educational officers on the role of Computer and the Teacher in promoting the first five principles of instruction, Role of ICT in Enhancing Education in Developing Countries, Learner-centered approach to teach ICT in secondary schools, ICT integration in the classroom, Appraising the relationship between ICT usage and integration, the standard of teacher education programs in a developing economy, Teacher practice and the integration of ICT, Integration of ICT in teacher education computer assisted instruction and e-learning, Analysis of e-education: Developing as a potential learning system, implications of information technology for teacher education and research, effective teaching through e-learning and other significant areas.

Frederick and Kwame Ansong-Gyimah (2010) conducted study to assess the perceptions of students, teachers, and educational officers in Ghana on the role of computer and the teacher in promoting the first five principles of instruction. The perception of 395 participants (students, teachers and education officers) in Ghana were examined the role of the computer and the teacher in promoting the first five principles of instruction for quality teaching and learning. The results of
the study indicate that there were perception dissimilarities among the participants on the role of a computer and a teacher in implementing the first five principles of instruction. In addition, according to the findings, there is a mismatch of participants’ recommendations on training students to acquire computer skills, and training teachers to acquire skills in designing their teaching.

Guoyuan, Sang, Martin, Johan, Jotondeur and Chang (2010) found that classroom use of ICT directly depends on teachers’ computer motivation and the supportive use of ICT. Teacher’s constructivist beliefs, their attitudes towards computers in education and perceptions about the ICT related school policy influence ICT integration in and indirect way. An indirect relationship was found between teachers’ constructivist beliefs and their level of ICT integration.

Guoyuan, Martin, Johan and Jotondeur (2009) found that that successful ICT integration is clearly related to the thinking processes of classroom teachers, such as teacher beliefs, teacher efficacies, and teacher attitudes toward ICT. The results underpin the importance of an integrated and concurrent understanding of teachers thinking process. They also suggest that in order to improve the innovation of classroom activities, teachers thinking processes should be challenged.

Daniel Light (2009) did a study to examine the role of ICT in enhancing education in developing countries. Results obtained that Teachers reported that they developed the skills needed to initiate or increase the use of ICT with students. Most of the teachers in India and Turkey reported little ICT experience before Essentials, whereas most Chilean teachers had previous trainings and experience using ICT. Regardless of their experience with ICT, all teachers we interviewed who took the Essentials Course reported they increased their knowledge of how to use ICT as an educational tool. For teachers with no prior experience, the Course helped them acquire basic skills. However, all of the teachers commented on how the Course helped them see ICT as a pedagogical tool. The strategy of having teachers design a model unit of their own choice
appears to allow teachers to work on skills and areas that are new and challenging for them.

Hadjerrouit (2008) designed an exploratory study on using a Learner-Centered approach to teach ICT in secondary schools. It can be ascertained that student teachers made a real progress in their attempt to apply the ICT teaching method in their classrooms. To exploit the full potential of the method in future experiments requires the stakeholders involved in teacher education and secondary schools to be initiated into all its aspects. The implementation entails taking into consideration both internal and externals factors affecting the introduction of innovative ICT teaching methods, changing the stakeholders’ views and practices to help them integrate innovative ICT pedagogies into secondary school environments.

Jotondeur, Hilde, Johan and Martin (2008) focussed on “ICT integration in the classroom: challenging the potential of a school policy. Results found that the potential impact of policy related factors on the actual integration of ICT in daily classroom instruction. The findings suggested that successful ICT integration is clearly related to actions taken at the school level, such as the development of an ICT plan, ICT support, and ICT training. The results also suggest that principals have to develop a more – collaborative approach when defining this policy. This study underpins the importance of a shared and school wide vision about ICT integration that reflects the opinions and beliefs of the principal, the ICT co-coordinator and the teachers.

Mohamed Maiga, Tchombe and Toure (2008) studied on “Getting ready for higher education: the role of ICT in secondary schools”. It was obtained from the results that the use of ICT can help secondary school students develop the cognitive skills necessary for higher education and for life when accompanied by appropriate pedagogies in school. They suggested that Teachers who pedagogically integrate ICT into their curriculum nurture student learning in a variety of ways. Moreover, they tend to embrace more open teaching strategies that help prepare high school students for a world that will never stand still, and
where learning becomes a dynamic process. It is not how much we know that matters, but how well we learned how to learn, and how well we can adapt, communicate and create. African students are using ICT to engage more actively in their learning. These new trends in education need to be understood by teachers so they may maximize the benefits of ICT for pedagogical reform and improved quality of education.

**Nwachukwu Prince Ololube (2006)** studied on “Appraising the relationship between ICT usage and integration and the standard of teacher education programs in a developing economy”. This research endeavor might have made a considerable stride in the understanding of the impact of ICTs on teacher preparation towards producing a new caliber of teachers whose professional ability are very essential in a developing economy. However, it would be very useful to further probe some of the findings that have emerged in this study.

**Robert, Peter and Joseph (2004)** conducted a study on 439 primary and secondary students to examine the ICT learning in the classroom: The influence of students, the class-group, teachers and the home. A model of classroom ICT classroom learning culture inclusive of the influence of the individual student, the class-group, the teacher and the home ICT environment was conceptualized. Results obtained that students generally expressed confidence in their capacity to use ICT in their learning, but were less certain about the extent to which this learning was supported by teachers and parents. The analysis also shown that attributes of the individual student were more influential than those of the class-group and of the teacher on effective ICT learning. The home ICT environment was shown to mediate the influence of individual student ICT learning behaviours on the development of positive attitudes towards the use of ICT at school.

**Myung-Geun Lee (2003)** did a comparative study to find the ICT Integration Initiatives in Korean, German and American Educations. Convergences were found especially in terms of intervention of central government and the spectrum of core policies. Divergences were found especially in implementation
approaches and processes of policy decision-making regarding ICT integration into education. Comparing divergences among the three countries reveals common tasks for which they may cooperate on in order to resolve mutual problems. Through the observation of school sites of each country, as well as related literatures, one can see that ICT integration is still far from being satisfactory. Thus, it is implied that, in addition to individual country’s efforts such as increasing teacher training, diverse international cooperation focused on common problems must be devised among the three countries.

   **Lorrae Ward (2003)** studied on “Teacher practice and the integration of ICT: Why aren't our secondary school teachers using computers in their classrooms? This study focused on secondary school teachers to find the practice and the integration of ICT. Data obtained during this study regarding the current levels and types of use as well as potential constraints are discussed. Findings from the study support the contention that there is only limited use of computers in classroom practice. They also show that there is a clear need to do more than provide infrastructure and professional development if this level of use is to increase and the current level of expenditure to be justified in terms of improving teaching and learning.

**Indian Studies**

   **Vimal Kumar (2010)** designed on “Integration of ICT in teacher education computer assisted instruction and E-learning”. He found that the students taught by computer assisted instruction method performed well than the students taught by conventional method in learning the concepts of universe. The study found favorable result and the students found to be interested to learn through CAI. Government may distribute CAI packages of all subjects to all schools that they can use it their daily teaching learning process.

   **Namita and Deepshikha (2009)** conducted on Analysis of e-education: Developing as a Potential Learning System in Jammu Region: India. This study revealed that identified five specific areas where changes in the role and attitude of academic staff in tertiary institutions were necessary to accommodate e-teaching
and the acceptance of the associated technologies. These changes highlighted the need to look at the course in a new way and re-think and adapt existing course delivery, Move from being a content provider to a content facilitator who has a good knowledge of their subject area, Gain proficiency in using the tools so that there is an understanding of both its strengths and its weaknesses, Learn to teach in absence of face-to-face interaction. And Gain an understanding of students' needs and lifestyles in their own communities. The author has proposed a model which is not only catering to the basic educational needs, but also to their need for career or future growth has also been taken care of. It is high time that we integrate the education and career options for the people of Jammu instead of segregating them.

Kamalnayan (2008) studied on “Implications of Information Technology for teacher education and research”. The study found that bulk of the faculty currently engaged in teacher preparation is neither prepared to use technologies nor has it updated its knowledge on technological developments. Universities and teacher education institutions would require a significant commitment to provide training for faculty staff, and to provide resources. Unless substantial effort is made on the part of universities, teacher educators and trainees alike will be deprived of the joy of using ICT.

Nimavathi and Gnanadevan (2008) conducted a study on “Effectiveness of Multimedia Programme in teaching science with a set of children studying in the ninth standard” and finding out its effectiveness over the conventional method of teaching pretest-post test equivalent groups design was followed for this study. Results found that the multimedia programme prepared by the researcher is more effective for the achievement in science of ninth standard students. The students learning through multimedia programme are found to be better than the students learning through the conventional method of teaching. The major findings of this study were i) there is no significant difference between the experimental group and control group in the achievement of science at pretest level. (ii) There is 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 fared better in science than the students learning through the conventional method. (iii) There is a significant difference between the mean achievement test scores of the pretest 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.

Jyothi (2007) designed a research method to investigate the “Impact of computer based learning on students of chemistry”. Results revealed that the self instructional module prepared by a teacher through power point presentation had immense positive impact on learning of chemistry. The preparation of this module is very easy and simple it has opened a new way and is very much helped to teachers in their physical sciences instruction.

Rachana Rathore (2007) studied on “Effective teaching through e-learning”. The author emphasized that the utility of e-learning in making teaching effective, and the challenge of educational organizations that aspire to provide e-learning in India is to get a good program that meets the learners needs and then makes the cultural changes in the way they learn. India is a multilingual country and most of e-learning or India knows vernacular languages. However the content of e-learning or e-education is only in English. Hence to make e-learning successful in India the digitized text has to come in these languages also rural India can benefit only by establishing e-learning centers with content in local languages and the users would be able to cross cultural boundaries by collaborating with learners from others cultures thereby reducing the gap of digital divide.

Manojkumardash (2007) carried a study on “Integration of ICT in teaching learning” a challenge. It was found that Information and Communication Technology is an important instrument that can transfer the present isolated, teacher centered and book centered learning environment into a student centered environment, and the author avers that ICT can change the traditional concept of learning process. They conclude that ICT helps in the professional development of teaching and learning and individuals involved in the programs of teacher
education. It can be infused in the learning process so as to acquire the knowledge and skill efficiency. ICT provides access to resources so that teachers, can apply new knowledge and skills they have learnt. Communication technology will be able to develop the capacity of the teacher and teacher educator and at the same time can strengthen the capacity of teacher educator, which is the fundamental requirement of effective transactional strategy.

2.9. ICT and Gender Differences

Chaitali (2009) examined to know the Effects of education and ICT use on gender relations in Bhutan. This study revealed that the types of ICTs in use and the year in which they were introduced varied between the two sites examined in this study. Despite this contrast and other contrasts in geography, culture, livelihoods, language, and infrastructure, the relationships between gender, education, and perceptions and uses of ICTs in Thimphu and in Tangmachu largely mirrored one another when comparing similar education levels across the two communities. The role of literacy and numeracy were found to be existing gender norms, and the increased opportunities stemming from higher levels of education included broader social networks, enhanced employability, and increased mobility. The relevance and existing use of a particular ICT among others in an individual’s social network played a critical role in how the technology was perceived and used by that individual.

Philip (2009) Studied on Age and ICT-related behaviours of higher education teachers in Nigeria. The study examined ICT attitude, competence, and use pattern of teacher educators. It also examined the effect of age of educators on time used in interacting with ICT. Four hundred and sixty seven teacher educators from 10 teacher education institutions (5 colleges of education and 5 universities) participated in the study. Data were collected with the aid of four research instruments. Findings revealed that age is not a factor when considering the attitudes, competence and use pattern of teacher educators. In addition, age was not found to affect the time used on ICT by higher education teachers in Nigeria.
Indian Studies

Michael and Sylvia (2011) studied on Gender, Culture and ICT use in rural south India. In this article explores how women use and perceive information technology in five villages in rural Tamil Nadu, India. The analysis was structured in-depth interviews with 17 women Internet kiosk users and 22 women who have never used the Internet (non-users). This study was identified several critical issues that (1) rural women in this study find ICTs useful; (2) there are gender-specific usage patterns and perceptions of ICTs; (3) obstacles to ICT use are generally structural (time, location, illiteracy) and not personal (for example, a prohibition from a relative); and (4) manifestations of gender awareness correlate with perceptions of obstacles to ICT use. Information and Communication Technologies hold great promise in the drive for development and poverty reduction in the global South, yet in order to ensure that the entire population reaps the benefits of these technologies, a clear understanding of the specific needs of women and other disadvantaged groups is imperative.

Jayaraman, (2006) conducted a study to assess the Relative effectiveness of computer based Multimedia Learning Packages on performance and behavioural outcomes of students of different age groups. Findings of the Study were 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 group 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. 6. 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.

**Bani (2005)** did an empirical study to assess the “Internet knowledge of teacher trainees. It was found that no significant difference between the male teacher trainees and their female counterparts in their mean score on internet knowledge. On the contrary, Rajasekar and Senthikumar (2004) in their study found that of rural secondary school students were higher than their urban counterparts.

**Beena (2004)** conducted A Comparative Study of the Efficacy of Teaching through the Traditional Method and the Multimedia Approach in the Subject of Home Science. The results revealed that 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 favorable 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.

**Nishi (2002)** focused on Indira Gandhi National Open University (IGNOU) teleconferencing for distance learners. This study concluded that Very few participants were found attending the teleconferencing programmes. Usually the participants were found attending the programmes attentively. Participants wanting to ask questions seemed more interested in the programmes. It was found that the time allotted for the talkback session usually was not enough. Some learners
having vernacular background expressed apprehension about the comprehensibility of the programmes. They felt inhibitions in discussing and asking questions. There were mixed responses regarding the effectiveness of the teleconferencing programmes. Some found these programmes very exciting and wonderful, whereas others could not utilize these programmes properly. Proper coordination is required among all the personnel involved in IGNOU Teleconferencing.

2.10. Summary

This chapter has reviewed relevant literature on the topics of teachers ICT usage and their perceptions towards it, policy and the future of education in order to set the research context, lay the foundation upon which this research is based, and define the academic and research areas of relevance to the research focus. Research evidence seems to indicate that ICT usage is increasing among teachers and their increasing contact and exposure to ICT has resulted in positive perceptions towards ICT, because they are becoming aware of its potential benefits for their teaching. However, the literature review has shown that teachers are faced with obstacles to their ICT use, the most frequently cited in the literature being lack of time and training. Nevertheless, most teachers have been found to be self-motivated with positive views of the future of education. The next chapter focuses on the research methodology used in the field work of this study.