

A  
RESEARCH REPORT  
ON

**Analysis of Trends in ICT in Education**  
**(ET Abstracts and Researches on ICTs in Education)**

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## **Introduction**

### Overview

Information and Communication Technologies (ICTs) are defined as all devices, tools, content, resources, forums and services, digital and those that can be converted into or delivered through digital forums, which can be deployed for realizing the goals of teaching learning, enhancing access to and reach of resources, building of capacities, as well as management of the educational system.

These will not only include hardware devices connected to computers and software applications, but also interactive digital content, internet and other satellite communication devices, radio and television and telecommunication services, web based content repositories, interactive forums, learning management systems, and management information systems.

Area of Information and Communication Technology is ever evolving and hence, the scope of the services produced extends to almost all of the aspects of development from Education and Employment to adopting reforms in Governance. The dynamic nature of ICT demands adaptability and the need for the same is notable in the field of Education. As an effective medium to impart education in the spectrum of educational settings from conventional classroom setting to open or correspondence learning, ICT stands relevant in bringing together the processes for digitization, development, deployment and management of content, platforms and processes for capacity development and creation of forums for interaction and exchange.

Inception of Information and Communication Technology roots from the conceptual ground of Educational Technology (ET), which is defined as the efficient organization of any learning system adapting or adopting methods, processes and products to serve identified educational goals. ET is involved with systemic identification of the goals of education, recognition of the diversity of learners' needs, the contexts in which learning will take place, and the range of provisions needed for each of these. The mentioned has been since done through two routes, where one involved making substantial qualitative developments by introducing flexible systems and low-cost teaching-learning materials to name a few of such efforts. The other route involved introducing government sponsored schemes including partnerships with global players whose objectives covers establishing infrastructure and support system relating to ET needs of the institutions. Various efforts have been taken by the government and voluntary sectors to mobilize the potential of ET like accomplished by Maharashtra Knowledge Corporation Limited, Computer-Aided Instruction in Kerala, Head Start Programme in Madhya Pradesh and Mahiti Sindhu Programme in Karnataka and many more such initiatives which will discussed in the later parts of the report.

## Historical Background

ICT takes media and multi-centric participation to generate content of the curriculum and also provides immense reach for this content to be disseminated. With the responsibility to support and revolutionize one of the largest schooling systems, ICT holds potential to successfully leverage technology to make education become more feasible. However, the scope of ICT in educational sector is traced back with the inception of scheme for ET in 1972 during the IV plan where full assistance for procurement of radio cum cassette players and colour TVs was given to 6 State Institutes of Educational Technology (SIET). Computer Literacy and Studies in Schools (CLASS) project was adopted in 1984-85 where BBC Micro-computers were introduced followed by a Centrally Sponsored Scheme during 1993-98 (8<sup>th</sup> Plan) that provided financial grants for the project to educational institutions and also to cover new Government and Government aided secondary and higher secondary schools.

In order to make the software accessible beyond the higher secondary schools The National Task Force on Information Technology and Software Development (IT Task Force), constituted by the Prime Minister in July, 1998 made specific recommendations on introduction of IT in the education sector including schools for making computers accessible through the Vidyarthi Computer Scheme, Shikshak Computer Scheme and School Computer Schemes. It was also recommended that that 1 to 3% of the total budget was to be spent on provision of computers to all educational Institutions upto Secondary and Higher Secondary level during the next five years and SMART Schools were recommended on a pilot basis in each State for demonstration purposes. National Policy on Education formulated in the year of 1986 emphasizing on ET to be used for disseminating essential information and for training of teachers and enhancing the quality of education.

ICT @Schools was launched in December, 2004 and it underwent revision (2010) to include secondary stage students to learn through computer aided learning process and under this scheme, every year best teachers are selected from all over the country to be felicitated for their extraordinary efforts to enhance learning experience by the effective use ICT. The launch of these schemes intended to cover students from spectrum of socio-economic background with their relative geographical barriers. ICT has gained recognition in the National Curriculum Framework (NCF) 2005 followed by the National Policy on Information and Communication Technology (ICT) in School Education revised in 2012 which provided guidelines to assist the States in optimizing the use of ICT in school education within a national policy framework. In the year of 2013, The National Repository of Open Educational Resources (NROER) was launched in order to collate digital resources across all the stages of school and teacher education. Multilingual content is available for open access with the option to connect through events and forum based interactions.

Government of India in July, 2015 launched Digital India campaign which envisioned for the creation of ICT Infrastructure in the country along with E-Governance, Digital Literacy of

citizens and on demand services. On 7<sup>th</sup> November 2015, Hon'ble Human Resource Minister inaugurated Web portal and Mobile App of e-Pathshala during the National Conference on ICT in School Education. This revolutionary initiative made available all the print and non-print content including textbooks on the website or mobile app and introduced e-PG- Pathshala (PG Course in Education) containing series of lectures for culture, Physics and Chemistry and Mathematics laboratory experiments' and much more. Central Institute of Educational Technology along with being one of the important party to mobilize the above-mentioned initiatives at various levels launched a platform supporting Massive Open Online Courses (SWAYAM MOOCs) in the year of 2016 comprising of both long and short term courses available for public access and Institutional Capacity Building Initiatives like SWAYAM PRABHA airing 24x7 educational programs.

### Efforts to Mobilize Educational Technology

Educational Technology after its inception held the potential to consider teaching-learning process in a holistic manner as it formulated its approach on systems approach and corrective feedback, technology extending beyond the hardware of audio-visual aids. Various groups have extended to extract this potential and apply the same in making education more feasible and accessible to the population.

### Training in-service teachers': Using Multi-Media Approach (SITE)

The Centre for Educational Technology (CET), NCERT in 1975–76 launched the training with the objective to exhibit and allowing space to teachers practice “Science by Doing” as an example of an effective method for teaching science. This was initiated with the aim to address the problem of lack of familiarity about the subject in primary schoolteachers (about 1.6 lakhs) who were responsible to teach Class III. The Science Department of NCERT had launched the summer courses organized earlier which due to various reasons couldn't reach such a vast number of teachers quickly.

Availability of Technology such as the ATS-6 communication satellite made it possible to beam television broadcasts to backward areas. The communication of 22-minutes telecast programme in about 2,400 villages in backward areas in six states was not enough to bring about an attitudinal change, hence the training programme consisted of multi-media in the form of textual materials, activities radio programmes, and radio-vision programmes. The programme was provided a facilitator (a high-school science teacher who had received orientation in the multi-media package) to encourage interactive sessions among the trainees. The materials were designed in multiple languages where the Evaluation teams from CET sampled the attitudes and knowledge of teachers prior to the beginning of the course. Evaluations were summative of nature and the remarks received served as feedback for the second course. The second course comprised of 13 days where two groups and two teacher-facilitators worked in 1,200 television villages. Before the satellite footprint was drawn back from India, nearly 48,000 teachers were

trained in one year and were considered to have been successful in reaching its objectives. A follow-up study done six months later of the retention of attitudes and practices, and it was found that a large number of teachers were teaching “Science by Doing”. The places facing administrative failure faced hindrances in the application of principles taught in the programme than the teachers’ unwillingness.

### Avehi Abacus Project

Shanta Gandhi conceived the idea of Abacus in 1952 while working in the village of Nikora and had been engaged in early education and Bal Bhavan work for a long time. In 1981, Avehi was launched as an audio-visual research centre and within the span of ten years it started Abacus programme in Mumbai and develop learning materials in 180 schools in the two wards of the Mumbai Municipal Corporation. The materials relates to the curriculum of Classes V and VI available in eight languages and the programme reaches out to 100 schools in the districts of Chandrapur and Yavatmal in Maharashtra. The materials prepared encompassed themes about:

- Myself, my body, and our needs. Being aware of how one is different yet connected through the virtue of sharing common needs. Gaining the deep insight of the structure of the society, how earth is the one to fulfill our needs and animate and non-animate lives together binds us.
- Roles of social institutions including family, the state, class and caste in our lives, relevance and the influence of the same and whether to accept, challenge or reject these institutions.
- How to react to change which is inevitable? Learning about being proactive to change that is good and oppose the unwelcome changes.
- What one wants in their lives? What factors and specific goals I will be encouraged to achieve? Thinking about factors that would impact my future and of the ones around me.

The project combines the available resources with SUPW (Socially Useful Productive Work) time to focus on the above-mentioned themes during one-hour sessions which begins with 10 minutes of introduction of a novel idea through flip chart or a story. Further activities involves engaging students in debates, group activity and/or worksheets with the motive to enhance the quality of working together, peace and respecting each other and all living things.

### Gram Mangal Project, Maharashtra

The project is operational in the adivasi belt of Maharashtra that borders on Gujarat. The Gram Mangal Project was established in 1982 by Anutai Wagh and Ramesh Panse. The area lacked basic life sustaining commodities like drinking water and electricity let alone having a school. The two social activists realized the only solution to improve the conditions was to transform the Talukas into self-reliant communities by adopting several development programs. After gaining a foundation of establishing basic amenities in the community, they started to focus more on the educational programme. Gram Mangal maintains a library of education materials where the

curriculum is tailored around the child and related to the adivasi child's environment with exposure to Warli language followed later by Marathi. Linking development and education together, Gram Mangal's education efforts are focused on vikaswadis, training teachers and establishing healthcare and research programmes. Their reach has covered nine villages now.

### The Pastapur Effort

Initiated by Deccan Development Society (DDS) who envisioned of bringing together villages in the Medak district of Andhra Pradesh to form a body of local governance, and amalgamate them to advocate for women, the poor and dalits in the region. Two decade-old organization based in Hyderabad works with women's Sanghams and over the years have evolved their objectives from addressing the sustenance needs to issues related to food security, education and health needs of the region. This has resulted into gaining women a leadership position in the region which provided them with a new-found sense of dignity and maintain autonomy over the food production and management of the natural resources and media.

The motive of self-reliance is notable in the initiative to provide media the autonomy to focus on the region relevant issues. Women of DDS have utilized this accomplishment to conduct a dialogue within sanghams by producing multimedia videos addressing issues like production of BT Cotton seeds which had a huge impact around the world and is making a statement about current time's media policies. The group has worked with international organizations in Bnagladesh, Pakistan, Sri Lanka and Peru. DDS also operates an alternative school Paccheshale and sanghams 40 balwadis. Their take on education and development emphasizes on how power and autonomy can broaden the potential of the underrepresented part of the community.

### The Hole in the Wall

The immense potential of mixing play with work was realized by Dr. Sugata Mitra of NIIT. Dr. Mitra installed computers into the walls with a touch pad and found that the children in slum areas self-taught themselves several computer operations within a span of few weeks. The program was monitored in such a way that children would share information with each other in lieu of increasing their friendship circle compared to unhealthy competition over ownership of physical things that would conventionally occur in these situations. The self-instruction is built in a way of making "discoveries" which when reaching a level of expertise is directed to make new discoveries in a different application of computer systems, hence continuing the spiral of learning. It was observed that with the span of six months, the children have learnt almost all the mouse operations, opening and closing of programs along with internet surfing and downloading games, music and video. The initiative received much attention from different government and the project is operating in multiple states including Delhi, Madhya Pradesh and Maharashtra. Minimal Invasive Education (MIE) as called by its founder, Hole in the Wall project has undergone several modifications to protect the computers from dust, erratic power supply, threat of adults taking over the experiment to name a few. Working together with the NIIT engineers,

they monitor the computers installed through internet and an estimate of 40,000 children uses these computers. This revolutionary idea of spreading computer literacy among the younger generation has known its effectiveness in its learning methodology which is now borrowed by several countries including South Africa and Egypt.

#### Maharashtra Knowledge Corporation Limited (MKCL)

Government of Maharashtra in January 2000 appointed the Professor Ram Takwale to offer recommendations regarding the universalisation and integration of IT in all the organizations dedicated to higher and technical education in the state. On 25 April 2000, the committee submitted its report to the government where it was recommended the creation of a special-purpose agency now named as the Maharashtra Knowledge Corporation Limited (MKCL). After the formation of the agency, government appointed a Special Working Group to implement the recommendations of the committee.

The MS-CIT (Maharashtra State Certification in Information Technology) is an initiative from the part of The Higher and Technical Education Department (HTED) and MKCL where training is provided to about 425 different educational institutions, i.e. in ITIs; arts, science, commerce, law, and B.Ed. colleges; engineering colleges and polytechnics, etc. MKCL has collaborated with SNDT Women's University, Mumbai to developing multimedia materials about teaching of English in schools.

With the aim to develop into a world-class, globally competitive, flexible, and value-based educational system that is responsive to the individual, institutional, and social development needs of the people of Maharashtra and India, the corporation is integrating IT education and IT-enabled education into basic teaching and master world-class resources through IT.

#### Teach to the Future Programme by Intel Corporation

The Intel Corporation has initiated a programme of computer-aided instruction in coordination with 12 state governments, the Kendriya Vidyalaya Sanghatan, and the Navodaya Vidyalaya Samiti. With the aim to increase the professional efficacy of teachers and instructors in being able to use technology in support of project-based learning and to encourage active inquiry and higher-order thinking extensive training with supporting resources like Internet, Multimedia and assessment tools aligned with the local board curriculum framework were provided.

The program reached out to More than 4,00,000 teachers since its inception in February 2000 in India. Apart from this direct initiative Intel has also started a National Science Fair aimed at infusing the discovery among school children and increasing their interest in science and Mathematics. Fair permits students to explore their scientific aptitude to everyday issues and a suitable platform to exhibit their scientific talent and gain recognition for their work.

Intel's collaboration with the state governments of various states has led to further amalgamating their initiatives, where Intel selects two projects from each state for the national fair every year. This opens an opportunity to government school students to compete at the national and international levels. Intel India has also collaborated with educational and social institutions like

introducing a Technology Training Centre at Bharatiya Vidya Bhavan, Hyderabad to provide job-oriented training to students and unemployed youth and many such more.

**The Azim Premji Foundation: Initiative from the Corporate Sector**

A variety of private sector–government partnerships have been tried along with the government initiatives and The Azim Premji Foundation’s initiative is one of those remarkable efforts.

10,000 elementary schools in India were provided access to computers and this achievement also witnessed serious drawbacks regarding language and content appropriateness issues. The Foundation worked on creating animated content on CDs to meet this requirement where the child was kept the main player in the story. The modules hence prepared were available in multiple languages including English and Hindi and the diversity of subjects ranges from Science and Mathematics to co-curricular topics (like fan, telephone, and television) to expose the child to the urban environment. Forty minutes modules can be used as a teaching aid and teachers would duly receive the training programme on computer-aided learning.

As of January 2005, 69 titles for children in Classes I–VIII have been developed in partnership with state governments.

**IT @School Project: Computer-Aided Instruction in Kerala**

The IT @ School Project was initiated in Kerala to aid the learning of Class VIII students in 2003. The project in the duration of two years have reached out to 2,735 schools and have provided 25,700 computer systems also including Classes IX and X students in its purview.

The curriculum designed in support of the systems divides the allotted four hours per week time into two hours of theory classes and two hours to be spent on practical assignments. The assessment of knowledge is done through online examinations where the students are charged the minimal amount of Rs. 25 per month for the program and in the case of SC/ST students the state reimburses the amount. The project is funded through various sources, including the development funds of MPs and MLAs. So far, about Rs. 18 crores have been spent.

**Microsoft’s Project Shiksha**

Project Shiksha was introduced to accelerate computer literacy in India by providing a comprehensive programme that encompasses software solutions, along with providing extensive training for teachers and students. Microsoft composed a world- class IT curriculum and provided avenues for scholarships, for both teachers and students. Teachers were exposed to an IT literacy curriculum with the key objective to promote them to include IT interventions in their methodology of dissemination of knowledge in the classrooms. Covering over 80,000 school teachers and 3.5 million students across government schools where the launch happened in Dehradun, Uttaranchal and in the training hubs of the Navodaya Vidyalaya Samiti (NVS). The project has MoUs with the states of Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka and West Bengal. Microsoft Corporation India is also running a programme for the teachers of the Municipal Corporation of Delhi (MCD) and the Army Public Schools through Project Shiksha.



## Bhandup Municipal School Project, Mumbai

Founder of the project, Dr. Kusum Kamat based the objective of the project to provide multilevel, multi-graded, cooperative and fun education to children belonging to marginalized classes. The objective was planned to be accomplished by transforming teachers into educational technologists able to evaluate the need of the students and tailor the pedagogy accordingly suiting the pace of the student. After testing this on two municipal schools having 2000 children from Classes I-IV in the Bhandup slum area the result made her realize the pivotal role of the teachers in this process. It would be remiss not to mention problems from the side of students and their families relating to parental illiteracy, poverty and teachers facing issues with large classes, lack of refresher course for the teachers and irregular attendance from students as well absenteeism of parents in the process of education were found to be compounding restricting factors for effective delivery of the pedagogy. Hence, Teachers were provided with teacher-training programme in order to facilitate them to identify with the curriculum keeping in mind every student's personality relating to their methodology of dissemination, therefore increasing their overall efficacy. Preparation of support faculties like diagnostic tests to plan remedial measures, coming up with the situations that would help students showcase their talents, feel confident and actively participate in the learning process. Teachers were also held responsible to improve rapport with student's parents, actively search for methods to increase attendance and increase interest of the community and parent in participating in their children's learning process. The application of these holistic measures by the teachers paid fruits in making the curriculum more engaging as children learned better. The success of the pilot testing led to the extension of the project to 18 more schools with 165 teachers and 8,500 students. Teachers were provided training in which they were exposed to various technologies, seminar and visited by experts to provide curriculum related demonstrations. Although some resistance to change was found in teachers at the end of first year and in order to overcome the same the textual materials were converted to multimedia package to promote independent reach to teachers from the organizations in charge of the elementary education. The package is now widely used in District Primary Education Program in Maharashtra along with districts where education officers are inclined to help bringing change in the educational system.

## Connecting Indian Villages with the World through Internet

The TeNet group of IIT Madras along with n-logue communications pvt. ltd., Chennai has a commitment to provide Internet connectivity in the villages of India, and use that facility to drive education, health, and livelihood in the connected villages. The project uses indigenously developed corDECT wireless technology to provide connectivity to a village where a local entrepreneur in each village is aided to set up a low-cost Internet kiosk. and provide services in these villages. The setup usually winds up with wireless connectivity, computer, printer, power back-up, camera, and local language software and inclusive of maintenance charges of kiosk the total amount adds upto Rs. 50,000.

Today n-logue has over 2,000 kiosks in about 30 districts in different states where notably one of the main services provided by the kiosk is educational. Courses relevant to computer training and career utility courses on “how to make a bio-data” and “how to take good photographs” are learnt through the help of these kiosks. A major area of emphasis has been coaching children to pass the SSLC examinations through mock tests (which are graded) and online live video lectures (with interactivity), especially in subjects like English, science, and Mathematics.

The projects undertaken by the government, non-governmental and private sector organizations to mobilize educational technology has presented an encouraging picture although it is notable that the focus is skewed towards computers and the literacy about hardware part of the technology. The need for the broadening of perspective towards including the computers, software and internet into transforming the pedagogy as whole have yet to be seen. The balance of teachings aids and efforts from the teachers and designers of the curriculum has to be maintained to relate to the needs of the spectrum of students coming to institutions from different levels of the society.

Information and Communication Technology (ICT) has become, within a very short time, one of the basic building blocks of modern society. Many countries now regard understanding of ICT and mastering the basic skills as part of the core of education, alongside reading, writing and numeracy. The recent efforts of the Government of India (GOI) seek to deepen the use of ICT in almost every sphere of life. The Digital India Campaign (2015) strives to transform India into a digitally empowered society and knowledge economy by focusing on the three vision areas Digital Infrastructure as Core Utility to Every Citizen, e-Governance and Services on Demand and Digital literacy and empowerment of citizens. The three cardinal principle of the draft New National Education Policy (2016) viz., access, equity and quality could be served well by harnessing the huge potential of ICT. Any-time and any-where mode of delivering quality education using ICT is one such implication of technology in education. The Govt. of India undertakes various activities to widen educational opportunities promote equity and improve quality of educational processes at all level.

#### **NME-ICT under RUSA and ICT@Schools Scheme-2004 under RMSA, CAL under SSA**

A Project titled “Development of National Digital Library of India, towards building a National Asset” has been sanctioned to IIT, Kharagpur under NMEICT. The objective is to provide access to the knowledge repository in terms of books, e-learning material, encyclopedia, journals, monographs, reviews, research work, articles, Acts and other knowledge material etc. for the benefit of learners/professionals/scholars and other interested people especially located at as also to overcome the constraints of time and also finances. Till November, 2016, there are 19.75 lakh e-contents in the Library. The contents cover almost all major domains of education and all major levels of learners from school level to the highest level of education including lifelong learners. 106 institutions have contributed e-contents to the Library and users from 465 institutions have been registered in the Library.

The alpha version is now publicly available for registered students, faculty, researcher, officials, etc. The facility has been extended to 3.32 lakh students across all the Centrally Funded Institutions and some other State Funded institutions. Till now contents of 48 languages, including Indian as well as non-Indian languages, have been included in the Library.

### **Digital India (2015) -Skill, Scale and Speed**

Rapid Assessment System (RAS) provides an online mechanism for getting feedback from citizens on e-services provided by Governments across the country. Also, it facilitates analyzing the feedbacks and generating knowledge out of it, which in turn, helps in improving the users/citizens' experience in availing public services. RAS has integrated 27 States and Union Territories among which 169 departments are availing the benefits of this integrated service. 911 total services have been integrated including Cess pool booking, Water and Electricity bill payments to Marriage Registration and Certificate correction.

e-BASTA is a framework, implemented as a portal, brings together three categories of stakeholders: the publisher, the school and the student. It provides them with the following primary functionalities: 1. Students identifying bastas of interest and downloading 2. School/Teachers Browse content, pick what suits, organize into bastes 3. Publishers upload & manage content in the portal and, 4. The eBasta App, downloadable from the portal, runs on any Android smart device. The latest statistics reflect that 2,781 eContents have been organized in 115 e-Bastas. Among the 3,614 e-Basta Downloads, 53,226 e-content has been downloaded by the users.

The target of UDAAN initiative was to reach out to 40,000 youth in J&K over a period of 5 years. It was observed that youth from J&K were unable to find employment in many companies as either they were unaware of the opportunity in the companies or the companies were unaware of the talent pool that existed in J&K. The principal focus of the Udaan programme is to create an ecosystem that would bridge this gap.

The mission of DAISY Forum of India (DFI) is to eradicate the "Book famine" for persons with print disabilities. According to surveys conducted world-wide, less than 1% of the published information is available in alternate and accessible formats for use by persons with print disabilities. The lack of books and reading material has negative impact on the education, employment prospects and personality development of persons with blindness, low vision, learning and certain physical disabilities. DFI has also succeeded in increasing production of DAISY books by manifold. In the year 2012 alone, more than 2500 titles were added in the combined catalogue of DFI. This is a result of the efforts of the Capacity Building Committee led by Mr. Prashant Ranjan Verma, which has conducted series of DAISY production trainings and Training of Trainers, who in turn are training many more in DAISY production centers.

The options available in the SARANSH portal comprises of Self-review, Performance monitoring, Take Decisions, Data Visualizations, Communications and Data Uploading. The board exam statistics are publicly available at state-wise level and school type.

By its very design, an online lab cannot be identical or equal to an authentic traditional lab. However, online labs are equivalent in value to the learner because they address different learning styles and offer a more flexible and open ended environment for inquiry. The online labs constitute safe environments in which students can repeat processes without any risk as when using dangerous chemicals or costly equipment. The experiments can be accessed anytime and anywhere, overcoming the constraints on time felt when having access to the physical lab for only a short period of time. As online reactions are quick, they can be repeated multiple times, giving students' confidence in their results. Learning is measured using the 'learning-enabled assessment' through the Online Labs that facilitates in the assessment of; the procedural and manipulative skills of the experiment, the concepts and understanding of the experiment and a student's reporting and interpreting skills.

National Scholarships Portal is one-stop solution through which various services starting from student application, application receipt, processing, sanction and disbursal of various scholarships to Students are enabled. National Scholarships Portal is taken as Mission Mode Project under National e-Governance Plan (NeGP). Benefits of the portal include, Simplified process for the students bringing all scholarships information available under one umbrella and Single integrated application for all scholarships. Improved transparency is brought up by the system capable of suggesting the schemes for which a student is eligible and reducing duplicates to the maximum extent. Standardisation of the scholarships is possible through Master data for Institutions and courses at all India level and this led to a decision support system (DSS) for Ministries and departments as up-to date information will be available on demand. A Comprehensive MIS System is available to facilitate monitoring every stage of Scholarships distribution i.e. from student registration to delivery of funds.

e-Granthalaya has 3027591 total number of catalog records and the year-wise training conducted to familiarize the institutions about the portal has seen an almost steady increase as reported in 2017.

Beti Bachao, Beti Padhao programme was launched in 100 critical districts with the lowest child sex ratio on 22nd January, 2015 at Panipat by the Honble Prime Minister. The scheme has been received well and has been successful in establishing the improvement in Child Sex Ratio as a national agenda. With the criticality of the issue, this initiative has been expanded to 61 additional districts across the 11 States/UTs. Since its inception in January 2015, this programme has resulted in hundreds of local level innovative initiatives to promote the girl child. Some of these district/state level initiatives include installing digital Guddi Gudda Display Boards in offices and public places in Jalgaon district, Maharashtra; multi-sectoral interventions by Cuddalore district, Tamil Nadu which include dedicating special day on value of girl child,

linking Sukanya Samridhi Accounts with birth of girl child and felicitating parents, plantation drives symbolizing nurturing and care for girl child, prevention of child marriages; a social assistance scheme titled Ladli Beti for new born girl child born on or after 01st April 2015 by Jammu and Kashmir; cash reward of Rs. 1 lakh for whistle blowers informing about illegal sex selection announced by Haryana; Shaurya Dals and Har Ghar Dastak initiative in Madhya Pradesh, holding Special Gram Sabhas and Mahila Sabhas on child sex ratio in BBBP districts of Assam, Andhra Pradesh, Madhya Pradesh, Himachal Pradesh, Tamil Nadu and Tripura; local champions and brand ambassadors identified in Gomati district, Tripura, Jhunjhunu district, Rajasthan; Ambassador of Girl Child launched by Nagaland; recognizing girl achievers in the community in Sikkim, Andhra Pradesh and Tripura. With concerted efforts at national, state and district levels, the preliminary reports for 100 districts indicate that for the time period between April-March 2014-15 & 2015-16, an increasing trend in Sex Ratio at Birth (SRB) is visible in 58% of the BBBP districts; 69 districts have reported progress in the first trimester registration against the reported ANC registrations and status of institutional deliveries have improved in 80 districts against the total reported deliveries in comparison to the previous year.

It is proposed to provide digital classrooms in 5000 schools during 2016-17 and 2017-18. In 1638 schools the Digital class rooms have been started. Towards this goal of promoting Digital Classrooms Government of Andhra Pradesh has allotted Rs 45 crores for purchase of equipment in Government Schools during 2016-17. In other schools where no ICT labs exist, the digital classroom equipment will be supplied under State Government allotted funds during-17. NRI/CSR support is also being pursued to mobilise additional resources for this project @70:30 ratios.

Teacher Information Management System: Education Department is implementing Teacher Information Management System (TIMS), which is a web based application which will have complete and authenticated data for all teachers. Some of the features of TIMS are accurate, secure and authenticated online data repository for teacher information pertaining to teachers' service records, skill, training, appointment, transfer, promotion and retirement etc faster decision making and approval cycles through automated workflow of the online system for day to day administrative matters. Effective planning and utilization of existing manpower by identifying their skills. Time and energy of government employees both at administrative and micro level will be saved by the automated TIMS leading to optimum utilization of their services for the purpose of public.

### **Vidya Mitra**

Vidya Mitra has multitude of content ranging from subjects like Humanities and Medical and Health Sciences to Life and Basic Sciences from various premier institutes like BHU, IIT-Hyderabad, IIT-Gandhinagar, Dayalbagh Educational Institutes, IIT Madras and NIT Warangal to name a few.

**Shaala Siddhi-** Shaala Siddhi, a comprehensive instrument for school evaluation leading to school improvement has been developed by the National Institute of Educational Planning and Administration (NIEPA) for schools to evaluate their performance.

The framework enables schools to evaluate their performance in a more focused and strategic manner based on 45 parameters in 7 key domains, and facilitate them in taking professional decisions for improvement. The action plan for implementation of Shaala Siddhi has been shared with the States/UTs. Budgetary provision under Samagra Shiksha has been made for implementing Shaala Siddhi programme. Till date, nearly 6,04,780 schools of 34 States and UTs have completed and uploaded school self evaluation Dashboard on the Shaala Siddhi web portal. Nearly 18 thousand schools have completed the school self evaluation process. All the schools are expected to complete self and external evaluation by December 2018.

**ShaalaDarpan:-**The School Automation Application MIS/ERP- KV ShaalaDarpan is a single Integrated platform to deliver services to address academic and administrative requirements of various stakeholders namely students, teachers, management & parents to achieve the following objectives:

- Enable improvement in quality of learning
- Improve efficiency of school administration and governance of schools
- Improve service delivery of school education department to the key stakeholders including students, parents, community, teachers, and schools
- Access to near real-time and better quality data for decision support

In first phase of the Project KV-ShaalaDarpan has been implemented in 1099 Kendriya Vidyalayas with the objective to provide services based on School Management Systems to various stakeholders including Students, Parents and Communities.

**Shaala Sarathi:** Shaala Sarathi is a platform ([shaalasarathi.mhrd.nic.in](http://shaalasarathi.mhrd.nic.in)) to facilitate and link Corporate Social Responsibility (CSRs), States, UTs and NGOs and to enable them to partner on pilot innovative programmes under education reform initiatives.

It endeavours to provide an opportunity to States/UTs and CSRs to engage with NGOs having national presence duly vetted by the MHRD or the States partnering with them. Further, the portal is a repository to promote new technology, innovative models and pilot projects in school education. It also assists to streamline engagement and create transparency around external stakeholders wanting to partner with states/UTs.

Till date, 40 Corporates, 106 NGOs and 36 States/UTs have been registered on the web portal.

### **Geographic Information System (GIS) Mapping of Schools**

To ensure universal access to school including secondary schools within a reasonable distance of any habitation and without any discrimination, the Geographic coordinates of all schools along with the school information available in UDISE is being uploaded on the school GIS Web enabled platform. This effort of developing web enabled platform about school information (Spatial and Non Spatial) will add to the quality of planning and better utilization of resources available under different schemes. Mapping of 14,32,961 schools (94.09%) has been completed out of total 15,22,925 schools.

**Saransh:-** Saransh, developed by CBSE is a tool for comprehensive self-review for schools and parents. It is a data driven analytical solution for tracking performance of students, within schools, state, region and national level.

### **ICT in Education Curricula for School System**

ICT in Education Curricula for students, teachers and teacher educators has been developed at the national level and being implemented across the country. 805 MRPs/ KRPs of thirty six States/UTs were oriented on ICT curriculum for students and teachers and their roll out in respective states. Guideline for teacher, student and schools on cyber safety and security has been published.

States like Karnataka, Delhi, Telangana, Andhra Pradesh has customised the teachers course and developed state specific ICT curriculum with the support of NCERT. Initial discussion with ten more states i.e., Odisha, Telangana, Chandigarh, Assam, Arunachal Pradesh, Tripura, Mizoram, Manipur, Jammu & Kashmir and Tamil Nadu are in progress. RPs/ KRPs of Delhi, Karnataka, Andhra Pradesh, Assam, Arunachal Pradesh, Manipur, Mizoram, Tripura and Telangana have been trained separately. Kerala has already developed ICT Curriculum, Syllabus and textbook, which is under implementation for students. State Resource Group are being trained on use of course platform, online mentoring for implementing ICT courses in the state. A dedicated course portal <http://ictcurriculum.gov.in/> has been developed on MOODLE and two courses are being delivered as of now. Around 9000 teachers have taken the Induction course and nearly 250 teachers have taken the ICT-pedagogy integration course. Students' curriculum was piloted in 588 Navodaya Vidyalayas for one year. Cyber safety and security related topics are integrated in the ICT in Education curriculum for teachers and students. ICT in Education course for students is being implemented for 13000 students from class 3 to 8.

ICT in Education Initiatives by CIET, NCERT

### **National Repository of Open Educational Resources (NROER)**

NROER portal (<http://nroer.gov.in/welcome>) has been designed. Till date a total of 13663 files including 401 collections, 2721 documents, 565 interactive, 1664 audios, 2581 images and 6133 videos are uploaded. CIET-NCERT has conducted 19 capacity building programmes on NROER

(covering 805 MRPs/KRPs in 36States/UTs) for teachers and teacher-educators and a core group in states and UTs have been created. State/ UTs are being motivated to contribute resources on NROER and create OERs for their own state/ UT. This year KRPs/ MRPs of Telangana and Karnataka state have been oriented separately to create OER platform, e-content development and creation of metadata. New section on teachers, interest groups, schools and partner showcase created on NROER (<http://nroer.gov.in/chetana>). Many partners- VigyanPrasar, CCRT, Gandhi Smriti and DarshanSamiti, SCERTs, SIETs, AzimPremJi University, IT for Change, Amaze Infotainment Pvt. Ltd., Directorate of Adult Education, Vidya Online, Eklavya, Arvind Gupta toys etc.

### **MOOCs on SWAYAM PLATFORM**

There are nearly 260 million school going students and MHRD, GoI has launched a Massive Open Online Courses (MOOCs) platform popularly known as SWAYAM (Study Webs of Active learning for Young Aspiring Minds) on 9<sup>th</sup> July, 2017. The portal is offering various online courses for school education and higher education. NCERT has been developing course modules for Massive Open and Online Course (MOOCs) for school education system in 12 subject areas (Accountancy, business studies, biology, chemistry, economic, history, geography, mathematics, physics, political science, psychology and sociology) for classes IX-XII. Twelve (12) courses have been completed in the first cycle on SWAYAM platform (<https://swayam.gov.in/>). Nearly 22,000 students were registered on various courses. Twenty (21) courses have been completed in the second cycle on SWAYAM platform. Nearly 33,000 students were registered.

CIET-NCERT has been assigned the task of developing e-resources for Master of Education (M.Ed.) course jointly with Allahabad University; this project is funded by UGC. One course (Educational Administration, Management and Leadership in School Education) has been completed first cycle on SWAYAM platform in which 2115 were enrolled. The second cycle of this course is offered from 2<sup>nd</sup> July 2018. So far 996 students have registered.

Besides, an online course on action research for teachers is being conducted in regular intervals in the MOODLE platform (<http://ictcurriculum.gov.in/>). Post Graduate Diploma in Guidance and Counselling for in-service teachers is also offered through the same course portal. Several other online courses are also being developed for inservice teachers professional development and delivered through the portal <https://itpd.ncert.org.in/>

### **e-Pathshala**

A web portal (<http://epathshala.nic.in/>, <http://epathshala.gov.in/>) and mobile apps (Android, iOS and Windows) has been designed and deployed. The portal has 1666 audios, 1778 videos, 650 e-books (e-pubs) and 504 flip books. It has 3.89 crore visitors; 2.3 crore total YouTube views, 1.88 million app downloads and rating of 4.4 out of 5 on Google play store and 4.5 out of 5 on windows store. CIET-NCERT has conducted 19 capacity building programmes on e-Pathshala and digitisation of text books (covering 805 MRPs/KRPs in 36States/UTs) for teachers



and teacher-educators and a core group in States and UTs have been created. CIET-NCERT has provided support to the state of Haryana to digitize its textbooks and create a mobile App i.e., MERI EPUSTAK to disseminate these e-books to all stake holders. The states of Andhra Pradesh, Delhi, Haryana, Karnataka, Manipur, Mizoram, Telangana and Uttar Pradesh have started text book digitisation with support from CIET-NCERT and have contributed 152 e-books on e-pathshala.

Branding of e-Pathshala – “PINDICS” app started. The app has a rating of 4.8 out of 5 on Google Play Store. In all 35290 users have downloaded the app from Google Play Store. E-pathshala has been listed/ available on the UMANG App of Govt. of India. Mobile app “PARAKH” started to automate the process of data collection for evaluation of implementation of ICT@Schools Scheme in the country. The app has a rating of 4.0 out of 5 on Google Play Store. In all 1850 users have downloaded the app from Google Play Store.

### **E-content Development**

In total, 4833 digital resources have been developed in all subjects areas (EVS, Science, Social Science, Mathematics and Languages). These resources are being validated out on regular intervals and uploaded on NROER and e-Pathshala. Besides, these are being disseminated through DD-1, SWAYAM Prabha DTH TV channel and SWAYAM MOOCs for school education. Conducted 17 capacity building programmes on e-content development (covering 716 MRPs/KRPs in 30 states) for teachers and teacher-educators and a core group in states and UTs have been created.

### **SWAYAM PRABHA (Kishore Manch) DTH-TV Channels**

The Ministry of Human Resource Development (MHRD)- Govt of India has developed a learning plan for utilization of satellite communication technologies for transmission of educational e-contents through 32 National Channels i.e. SWAYAM PRABHA DTH-TV. CIET-NCERT is the national coordinator for one DTH TV channel i.e., Kishore Manch (#31) and has started feeding a 24x7 educational TV channel w.e.f. 09 July, 2018. Everyday four hour fresh slot is telecast and repeated six times in 24 hours to provide learning opportunities for the stake holders. For obtaining regular feedback from the stakeholders, email ids [ciet.kishoremanch@gmail.com](mailto:ciet.kishoremanch@gmail.com), [swayamprabha@ciet.nic.in](mailto:swayamprabha@ciet.nic.in), [kishoremanch@ciet.nic.in](mailto:kishoremanch@ciet.nic.in) and toll free number (1800111265, 1800112199) has been created. Till date several feedback mails have been received and shared with the production and transmission teams for follow up. Besides, transmission schedules are prepared for each month and shared with BISAG, Gandhi Nagar and the National Coordinator and also disseminated on CIET-NCERT website. Till date transmission capsules have been prepared and submitted up to 28 February, 2019 to BISAG, Gandhi Nagar. The transmission quality of the programmes is monitored by CIET. Viewers can watch the telecast on DTH-TV, Reliance Jio TV and mobile app Kishore Manch and provide feedback. A live transmission for 30 minutes daily (Monday to Friday) has been initiated w.e.f. 29<sup>th</sup> December, 2017.

## **ICTs-Pedagogy Integration**

Workshops were conducted for development of course materials for students under the Curricula for ICT in Education initiative in two phases from 1st-5th, March, 2017 and 6th-10th, March, 2017. Course content of year I and II of Student course has been developed and being adapted by states of Delhi, Karnataka and Telangana. Induction course for teachers has been implemented in Karnataka and more than 3000 teachers from 1000 schools have been trained. Refreshers courses are under development and simultaneously being planned to be implemented in Karnataka for 3000 plus teachers. Similar dialogue has been initiated with the states of Andhra Pradesh, Tamil Nadu and Odisha.

Master trainers training was conducted in 2 phases from 13th to 17th June, 2016 and 20th to 24th June, 2016 for the State of Delhi and 80 master trainers are trained on implementation of ICT curriculum for students. Training for key resource persons of Karnataka was conducted from 5th to 7th October, 2016 and 55 master trainers were trained on ICT in Education curriculum and implementation strategies. Development of ICT in Education curriculum for Odisha was discussed over videoconference. ICT curriculum content prepared for students developed by State of Telangana was reviewed and feedback was given during the workshop from 17th– 21st, October, 2016. In all 156 master trainers were trained and discussion has been initiated with the State authorities for ICT curriculum customization for the state of Andhra Pradesh.

### **ICT Awards**

ICT Awards was introduced to felicitate those who have enhanced student learning by effectively and innovatively integrating technology-supported learning into the school curriculum and subject teaching and thereby promoted enquiry based collaborative learning by using ICT amongst students.

ICT Awards nominees were observed to be invested in various software programs and external devices to complement their teaching in and outside the classroom arena. Awardee in the year 2010 has focused on using Paint pro, flash and presentations to develop idea approach and develop higher order thinking skills in students and also developed a digital lesson plan for third standard mathematics lesson division. In the year 2011, 15 awardees were felicitated for their efforts in using ICT productively for enhancing teaching pedagogy and their own professional growth. The purposes of using ICT effectively varied from inculcating speedy comprehension and value clarification in students to providing assistance in formative and summative assessments and presentation of research papers by teachers. Enhancing teacher learning process, ICT was observed to be used in both laboratory and classroom settings. Power point presentations, MS- Office, printer, digital camera, KYAN and projectors were few of the most used ICT services available at the institution for the above –mentioned purposes. Awardees of the year 2012 used ICT resources to learning experience through ubuntu, cartoons and presentations and organize learning activities and improve students' involvement in the classroom. 2013 and 2014 Awardees were observed to be extending the usage to include Skype, smart learning, online dictionary and moviemaking software to name a few. Smart classes were

seen to be utilized for acquainting students and increasing proficiency of teachers in audio editing, recording, regional language typing, animated simulations and photoshop. Awardees of 2015 were observed to be using the upcoming technological infrastructures like interactive smart boards, visual basic and HTML software, e-content to promote creativity and familiarity to the growing plethora of technological advancements. The progress was seen extending the confines of a classroom, such as using educational websites and digital diaries for upgrading teaching methodology of teachers and information processing of students.

### **Digital Initiatives by KVS**

#### **Project e-Prajna**

(i) 5076 Students in 25 KVs in 25 Regions have been given Touch Tablets pre-loaded with e-Contents of Maths and Science Subjects. Teachers of these KVs are using tablets for classroom transaction.

(ii) Promote flip-learning, reduce school bag load, learning at own pace and effective assessment.

#### **E-CLASSROOMS IN KENDRIYA VIDYALAYAS**

9711 e-Classrooms have been established and 2300 e-Classrooms are being delivered.

To promote blended learning, accelerated learning & better understanding of concepts and effective assessment

(iii) Teachers have been trained for capacity building.

#### **DIGITAL LANGUAGE LAB**

(i) To improve spoken skills of students in English Language, 276 Digital Language Labs have been established in 276 KVs across the Country (One in each KV)

(ii) These Labs are equipped with Desktop Computers, Language Lab Software, Modular Work Stations and Arm Chairs. Each Lab has 30 user capacities.

#### **Student Data Management & Information System**

Aadhaar as an identity proof obviates the need for producing multiple documents for providing one's identity ensuring greater transparency and accountability in public services delivery through effective use of technology. Aadhaar based Director Benefit Transfer (DBT) is a major governance reform initiative of the Government to ensure targeted delivery of benefits and services to beneficiaries of Schemes identified for DBT.

#### **Aadhar Database of Teachers**

Under UDISE, National Institute of Educational Planning & Administration (NIEPA) is capturing the data of teachers and students including their Aadhar etc. As on 14.03.2018 out of 58, 37,218 teachers of Govt. & Govt. Aided schools, Aadhar has been captured for 31, 20,354 teachers.

## **AadharDatabaseofStudents**

Aadhar enrolment of school going children in the age group of 5to18years in the country would help in tracking of children so that they do not drop-out from school and also for monitoring their academic progress and for ensuring benefits to be disbursed to them in cash or kind under various schemes.

Under UDISE, National Institute of Educational Planning & Administration (NIEPA) has initiated Child Tracking Programme. As on 14.03.2018 data of 25, 13, 36,317 students has been captured out of which Aadhar seeding has been done for 9, 26, 32,460 students.

## **Initiatives by State Council of Educational Research and Training**

### **Delhi**

SCERT, Delhi has taken a step ahead towards the ICT enabled online Capacity Building Programme for teachers with the objective to enhance the sharing between Teacher and Teacher; Teacher Educator and Teacher communication at their own pace without disturbing their routine work and to build capacity of In-Service Teachers through online training for updating content knowledge as well as classroom delivery. This capacity building programme can be accessed from Smartphone through mobile application called “chalk lit” and from the website [www.scertdelhi.chalklit.in](http://www.scertdelhi.chalklit.in). SCERT, Delhi developed the curriculum of “ICT in Education” for classes VI to X for DoE schools. The curriculum is organized under the thematic areas as programming, graphics and animations/internet and ICT Environment, data Representation and Processing, audio Visual communication, software application. It is implemented in the schools of DoE of Delhi from September, 2016. SCERT is also developing text books regarding “ICT in Education” curriculum for class VI to X. ET Department is in process of developing (printing is in process) the books for the students of classes VI for “ICT in Education” for the effective teaching-learning process. SCERT envisages development of educational video module lessons / programmes, across the spectrum of school education at all levels. Educational videos which are already been developed are uploaded on SCERT website [www.scertdelhi.nic.in](http://www.scertdelhi.nic.in) for reference and wide dissemination. SCERT has been developing manuals/reference material for the teachers of schools of Delhi on regular basis which is disseminated in the workshops/training programmes/seminars. For an easy and larger access to all the stakeholders these manuals are in the process of conversion in the digitized form for the e-pub and Dissemination of the same will be done through app and web-portal.

### **Andhra Pradesh**

The State Council of Educational Research and Training (SCERT) Andhra Pradesh was established on 27-07-1967, amalgamating the following institutions. 1. The State Institute of Education. 2. The State Bureau of Educational and Vocational Guidance 3. The State Science Education Unit. 4. The State Evaluation Unit. The initiatives carried out by the SCERT included

establishing Digital class rooms, E-Hazar (Bio metric machines in schools), APeKX (Andhra Pradesh e-Knowledge eXchange), Student and teacher Data bases and organizing platforms for online exams.

## **Gujarat**

The GCERT works as a prominent institution for implementing the policies, programmes and researches in the State. It provides resource support and guidance to all the teacher education institutions and works in collaboration with the NGOs, Subject experts, Educationalists and pioneers in bringing about reforms in the remote and underserved areas of the State. It disseminates latest information with regard to modern trends and approaches in primary education, pre-service and in-service education, pedagogical advances in the country, wide use of distance education as a mode of training, organizing community awareness programmes and updation of curriculum of primary education in view of new and emerging concerns. Even the State Ministry of Education banks upon its expertise. The Council is committed to bringing about qualitative improvement in school education particularly Elementary Education, development of curriculum syllabi, instructional material and evaluation strategies to explore suitable solutions to educational challenges with the changing time. The GCERT has scaled a unique journey with experimentation from chalk to satellite, scaling an arduous terrain in the field of educational reforms.

Under the umbrella of GCERT, there are now 26 DIETs (District Institute of Education and Training) functional in 25 Districts. These DIETs impart pre-service and in-service training to the primary teachers of the State. There are seven branches namely Pre-service Teacher Education (PSTE), Work Experience (WE), District Resource Unit (DRU), Curriculum Material Development & Evaluation (CMDE), Educational Technology (ET), In-service Field interaction Innovation & Co-ordination (IFIC) and Planning & Management PM functioning in these DIETs. These DIETs are well equipped with qualified and experienced academic and administrative staff.

## **State Institute of Educational Research and Training (SIERT), Rajasthan**

Welcome to State Institute of Educational Research and Training (SIERT) An Overview The State Institute of Educational Research and Training, Rajasthan (S.I.E.R.T.) was established in Udaipur on 11th November 1978 for qualitative upliftment in the area of school education, as recommended by Mahrotra Committee, setup by the Government of Rajasthan. Different state level units functioning at different places (State Institute of Education, State Institute of Science Education, Evaluation Unit, and Educational & Vocational Guidance Bureau) were brought under a single umbrella. The institute functions as an academic wing of the Director of Elementary and the Director of Secondary Education, Rajasthan, Bikaner. It acts as an academic advisor to the Department of Secondary Education and to the Ministry of Education in the state. SIERT is concerned with the academic aspect of school education including formation of

curriculum, preparation of textbooks, teachers' handbooks and teachers' training. The SIERT is located in the vicinity of Aravalli Hills Area largely dominated by tribal population. Endowed with a rich cultural heritage, natural resources and beautiful landscape, Udaipur is a world renowned tourist attraction. The SIERT is situated opposite to 'SAHELION-KI-BADI', a popular tourist attraction. Role SIERT is the apex academic organization designated under the provisions of the RTE Act-2009 for educational planning, implementation and evaluation for school and teacher education. It is an advisory and consultative body which assists and advises the state education department. It is the nodal agency for qualitative improvement at elementary school stage. It provides leadership, academic guidance and support to teacher education institutes such as IASEs, CTEs and DIETs.

### **Centre for Development of Advanced Computing (C-DAC)**

Centre for Development of Advanced Computing (C-DAC) is the premier R&D organization of the Ministry of Electronics and Information Technology (MeitY) for carrying out R&D in IT, Electronics and associated areas. Different areas of C-DAC, had originated at different times, many of which came out as a result of identification of opportunities.

The Government of India has approved a project entitled, 'Information Security Education and Awareness (ISEA) Project Phase-II' in the year 2014 with an objective of capacity building in the area of Information Security, training of Government personnel and creation of mass Information Security awareness targeted towards various user segments. The project envisages to spread mass awareness on Information Security through direct and indirect mode targeted towards various user segments including school children/teachers, college students/faculty, Central/State Government officials, general public, etc. The awareness content for these workshops *inter-alia* includes brief information on Cyber Bullying, cyber stalking, etc. Information Security Awareness handbooks were distributed as a part of these workshops to disseminate information and tips on safe use of internet. The softcopy of the handbook is also made available for download on the website '[www.infosecawareness.in](http://www.infosecawareness.in)'.

### **IT @SCHOOL, Kerala**

The IT@School Project under General Education Department was set-up to augment the IT education in schools and also to enhance the quality of IT education towards a complete ICT enabled educational system. The Project envisages enhancing the role of Information Technology as a teaching aid for learning all subjects. IT@School Project is termed as the Single largest simultaneous deployment of FOSS based ICT education in the world. Headquartered in Thiruvananthapuram, the Project has District Resource Centers in each district. The project is the nodal agency for all eGovernance activities under General Education Department and also the nodal agency for implementing EDUSAT operations in the State, under which an educational channel viz VICTERS is functioning. Kerala has been the role-model for other states in terms of numerous educational initiatives, but this remarkable achievement, IT education in the state in the early 2000 was not found effective with respect to the State School Curriculum. There was

no dedicated system to take care of this requirement and also there were inadequate infrastructural amenities available in the schools. To overcome this hurdle, Government of Kerala rolled out the IT@School Project in year 2001, to augment the IT education in schools also to enhance the quality of IT education towards a complete ICT enabled educational system. The Project is the outcome of the vision document developed by the State appointed task force headed by Prof. U.R.Rao in 2000.

The Project is now been implemented from Lower Primary to Higher Secondary classes in the state covering as many as 12,000 schools. An estimated 50 lakhs students and 2 lakhs teachers are now part of this project who have benefited from ICT enabled education. The Project operates through 200 Master Trainers, who are school teachers attached to the Project on working arrangement, School IT Co-ordinators (selected subject teacher in each school) and Student School IT Co-ordinators. The Project functions completely on Free Software platform since it provides the freedom to an individual to study, copy, modify and re-distribute any content, a process which would ultimately benefit the whole society. The Project aims to empower all the school teachers in the state on ICT tools, making them IT champions and also to implement ICT enabled learning system for all subjects. Apart from infrastructure deployment to schools, the Project also ensures the proper maintenance of hardware equipments at schools through Hardware Clinics and reporting of faulty machines through the webportal which would then be rectified. Being the nodal agency of General Education department for e-governance, almost all the functions of the department has been automated by the Project.

IT@School is the nodal agency for implementing EDUSAT network in the State and runs an exclusive channel for education called VICTERS (Versatile ICT Enabled Resource for Schools), which is now aired for 17 hours a day- from 6am to 11pm. The project has now associated with BSNL and RailTel to provide high speed Internet broadband connectivity to all high schools in Kerala. The success of the Project can be visualized by the conduct IT practical examination in free software for students, first of this kind in the world with so much vast resourceful deployment of free software. The efforts of Project saw deployment of adequate IT infrastructure to all schools including computers and other accessories.

## **Methodology**

ICT have been an ever-dynamic sector with its influence expanding possibilities of an economy in all directions. Attempts of tapping this potential have been explored in the past twenty years where ICT has made some very substantial changes within business and governance. In order to trace the remarkable milestones achieved by introduction of ICT in the field of Education, the methodology should as well be extensive and comprehensive which will be discussed in detail in the current chapter.

The Education sector is primarily comprised of activities that orient one to social norms and mores where the circulation of quality education has been associated with strong teachers having high degrees of personal contact with learners. The research focusing on the education hence should encompass the comprehensive coverage of the literature related to emerging trends and in relation to use of ICT in particular. The methodology has been divided into a procedural sequence that approaches the research incepting from literature review to reviewing findings of the working group already employed in the field of study and constantly updating the trend report.

The literature was collected from the physical library, online repositories and websites of organizations and relevant stakeholders. National policies and schemes formulated on ICT education in the country were taken into consideration while composing the report while updating the same periodically based on the latest periodicals, newspapers and research journals. Journals have been also explored for keeping up with the trends of researching emerging in the field of Educational Technology and ICT.

Extending beyond the literature survey, the critical analysis is important to identify the gaps in research and implementation done so far with concern to ICT in Education. This presents a rich, bias-reduced perspective and much needed direction to which the schemes and policies along with various projects in future can orient themselves too. Stakeholders, governmental and non-governmental and corporate institutions can benefit the most from the report's streamlined approach towards assessing the work done in implementation as well as research in the area of ICT in Education, hence saving and directing resources to the areas where more focus is needed.

In the later chapters of the report, the extensive review of recent researches conducted in ICT have been composed to provide an overview and critical blind spots that may use more focus and coverage from the scientific society. The description of compiled research abstracts presented before the gaps in research is arranged with the intention to provide a complete picture of literature available regarding this revolution from its inception till the year of 2017.

Recent developments in including ICT in education at all levels have seen some very innovative and novel approaches extending from schemes and policies to technological applications, tools and services. For instance, online repository NROER developed by Department of School Education and Literacy, Ministry of Human Resource Development, Government of India and



managed by Central Institute of Educational Technology (NCERT) has contributors from several partners including State and Private institutions as well as individuals. This varied approach to disseminate knowledge at a global platform has presented various benefits and has improved accessibility. There are also avenues to form or join an interest group which has evolved the present platform to a whole new level of interaction about dissemination and accumulation of knowledge.

The report terminates with the intent of presenting a trend from both research and application worldviews which has been circulated through multiple modes for extended accessibility.

**1. Methodology:** The following methodology/procedural sequence will be adopted to carry out the present research

1.	Study library ,online and other possible sources to analyze the emerging trends with regard to access and use of ICT in education and to compile research abstracts
2.	Study sources to compile abstracts on researches to analyze the trends in the use of available software's, ICT Services, contents, tools and apps
3.	Study Journals, articles, research papers, periodicals, News papers and every possible source to analyze the trends in research in the area of ICT in Education
4.	Based on the above identify gap areas in research
5.	Review the findings in a working/expert group meeting
6.	Prepare a trend report and disseminate through Multiple Modes
7.	Constantly updating the trend report

## **National and State ICT Policies: Salient Features**

### Introduction and Historical Context of National and State ICT Policies

The introduction of ICT although relatively new has witnessed phenomenal growth especially noted in its application in the field of education. In Indian scenario, the Education is placed in the Concurrent list as provided in the Seventh Schedule to the Constitution of India which gives a unique place to educationists that aim to develop, monitor and design the framework of education for the population. ICT playing part of more than a revolutionary tool appears to on the monitoring of Union and State Legislatures. The Union government in the year of 1961 formed the National Council of Educational Research and Training (NCERT) as an autonomous organization that would advise both the Union and State governments on formulating and implementing education policies. In 1968, the First National Policy on Education was introduced to enhance educational equities followed by another National Policy on Education in 1986 which was later modified in 1992 that brought the limelight to Educational Technology's (ET) role in enhancing the quality of education. Two major centrally sponsored schemes were introduced by the policy: Computer Literacy and Studies in Schools (CLASS) and ET itself. As the technology and communication services were taking a firm root and expanding their applicability in the country by leaps, there was a need for the more comprehensive centrally sponsored scheme which was introduced in ICT@ Schools in 2004. National Curriculum Framework (NCF) 2005 emphasized on the role and potential of ICT in education which was echoed in flagship programmes (Sarva Shiksha Abhiyan) and school norms recommended by Central Advisory Board of Education Government of India in July, 2015 launched Digital India campaign which envisioned for the creation of ICT Infrastructure in the country along with E-Governance, Digital Literacy of citizens and on demand services.

### **1. Salient Features of National Policy of ICT in Education**

Policies introduced by the government in order to introduce the advantages of including ET and ICT in the field of education as mentioned above has started in 1986 and as the inclusiveness of technology has surpassed the function of a mere tool to a conduit of dissemination of knowledge.

The vision of the National Policy on ICT comprised of holistic socio-economic development of the country in which preparing the youth to lead a society founded on knowledge and enhance their creativity in the institutions and growth. ICT hence was envisioned to bring in state of the art technologies, extensive exposure to a safe, productive to interact and experiment to address multitude of issues concerning the society at large. Policy focused to providing free and open access to these resources for students and teachers aiming at enabling inquisitiveness and providing training to build independent capacities to manage ICT infrastructure at their institutions.

The ICT literacy was proposed to be gauged into three levels namely, basic, intermediate and advanced. The basic level refers to the competency in operating a computer to store, retrieve and manage data and be able to perform primary word and data processing tasks with internet operational use for emails and managing content in external drives of the computers. Intermediate level refers to the competency of person to be able to manage content using multiple software applications and using websites and search engines to retrieve information and be able to perform preliminary troubleshooting. Advanced level is to be attained by the personnel mastering the art of using database applications and is able to perform computing and with the help of audio-visual communication applications are able to carry various projects and research as and when required. Using ICT for documentation and creation in web based networks for collaborative learning along with the necessary awareness about cyber security and copyright issues about their resources and sensitivity to resources made available by others is also considered to be under the advanced level of competency.

## **1.1 Challenges and Issues**

Education system in India consistently dealt with the concerns of accessibility of resources to all the sections of the society. Alongside equity issues in Education, quality of content delivered by the instructors around the country has been often raised. With the increase in the development of ICT, the technology needed has become more accessible, reliable and mature where the same can be now leveraged in the sector of education to resolve the feasibility issues.

## **1.2 Provisions made in the Policy**

National Policy of ICT in Education has defined strategies to affirm the infrastructure both tangible and non-tangible at the state and national level. States were advised to adopt or adapt an e-governance and automate school administration programme for schools. Installation of a school based Management Information Systems (MIS) was defined to construct capacities for implementation of above-mentioned programmes. Local Area Network customized to enable library and office automation along with maintenance, cached access to internet resources, student tracking and resource planning were other suggestions made by the policy.

### **1.2.1 Development of ICT infrastructure**

Policy defined two types infrastructure namely, Core and Enabling ICT infrastructure. Core infrastructure would consist of Hardware, Network and Connectivity and Software and Enabling infrastructure compounded of supporting resources in terms of electricity, physical space and facilities and safety precautions to enable the efficient use of ICT resources in the school.

### **1.2.1.1 Core Infrastructure**

#### **Hardware**

- The States will establish state of the art, appropriate, cost effective and adequate ICT and other enabling infrastructure in all secondary schools.
- Based on the size of the school, needs of the ICT programme and time sharing possibilities, States will define an optimum ICT infrastructure in each school. Not more than two students will work at a computer access point at a given time. At least one printer, scanner, projector, digital camera, audio recorders and such other devices will be part of the infrastructure.
- Each school will be equipped with at least one computer laboratory with at least 10 networked computer access points to begin with. Each laboratory will have a maximum of 20 access points, accommodating 40 students at a time. The ratio of total number of access points to the population of the school will be regulated to ensure optimal access to all students and teachers.
- In composite schools, exclusive laboratories with appropriate hardware and software will be provided for the secondary as well as higher secondary classes.
- In addition, at least one classroom will be equipped with appropriate audio-visual facilities to support an ICT enabled teaching-learning.
- Appropriate hardware for Satellite terminals will be provided to selected schools in a progressive manner.
- Computer access points with internet connectivity will be provided at the library, teachers' common room and the school head's office to realize the proposed objectives of automated school management and professional development activities.
- ICT enabled education can be significantly enhanced and the range of classroom practices expanded with the introduction of digital devices like still and video cameras, music and audio devices, digital microscopes and telescopes, digital probes for investigation of various physical parameters. These will also form a part of the infrastructure. States will make appropriate choices and promote the use of such devices in classrooms.

#### **Network and Connectivity**

- All computers in the school will be part of a single local area network to enable optimum sharing of resources. In addition to the laboratory, internet connections will also be provided at the library, teachers' common room and the school head's office.
- Each school will be serviced with broadband connectivity capable of receiving streaming audio and video, a range of digital learning resources and interactive programmes. The number of computers given internet connectivity will be governed by the available

bandwidth, in order to ensure adequate speeds. A mechanism to have offline access to internet content will be set.

- Teachers and students will be educated on issues related to the safe use of internet. Firewalls and other security measures will be implemented to guard the school network against cyber attacks and misuse of the ICT facilities. Appropriate guidelines for network security will be developed.
- An EDUSAT network will be planned at each state with interactive terminals (SIT) and receive only terminals (ROT)

## **Software**

- A software environment favoring pedagogy of learning which promotes active learning, participatory and collaborative practices and sharing of knowledge is essential to nurture a creative society. Free and Open Source Software – operating system and software applications will be preferred in order to expand the range of learning, creation and sharing.
- A wide variety of software applications and tools, going well beyond an office suite is required to meet the demands of a broad based ICT literacy and ICT enabled teaching learning programme. Graphics and animation, desktop publishing, web designing, databases, and programming tools have the potential of increasing the range of skills and conceptual knowledge of the students and teachers. A judicious mix of software applications will be introduced in schools.
- Creation and widespread dissemination of software compilations, including specialised software for different subjects, simulations, virtual laboratories, modeling and problem solving applications will be encouraged. These will be distinct from multimedia packages and digital learning resources.

## **Enabling Infrastructure**

- The enabling infrastructure required to efficiently maintain the ICT facility will be defined, established and maintained.
- Regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, including alternate sources of energy, where needed, will be ensured. Students and teachers will also be trained in the safe use of electrical outlets and fittings.
- Physical facilities like an adequately large room, appropriate lighting and ventilation, durable and economic furniture suitable for optimization of space and long hours of working will be established. Alternate layouts and arrangements facilitating interactions amongst students and with the teacher will be encouraged.

- Adequate safety precautions and rules for use will be established. Each laboratory will be equipped with a portable fire extinguisher and students and teachers trained in its use. An appropriate fire drill will also be implemented.
- All the equipment and resources will be secured from theft and damage. They will also be covered under an appropriate insurance policy against theft and damage.

### **Sharing and dissemination of Digital Content**

- Widespread sharing and dissemination of digital content will promote infusion of ICT into classroom practice. Suitable open standards for interoperability, web based sharing and appropriate norms for free access will be defined to catalyze use of digital content and resources.
- Collections of digital content and resources will be deployed on web based digital repositories, which will be universally accessible. Private Public partnership projects for the same could be encouraged. State level and National level repositories will be developed and maintained. Emphasis will be placed on multi lingual digital learning resources development in State Regional Languages with facilities for translation to other languages so as to optimize time, effort and cost. Content Delivery Networks will be developed to enable transmission of content from multiple locations.
- National level organizations like Central Institute of Educational Technology (CIET), National Council of Educational Research and Training (NCERT), Indira Gandhi National Open University (IGNOU) and State level organizations like State Institutes of Educational Technology (SIETs) will play a proactive role in developing and sharing of digital content and its source code to support wide scale adaptations. They will also support the capacity building activities of teachers in digital content development and usage.
- Content developed by state funded projects and programmes will be deployed along with source code under appropriate licensing norms (like the creative commons) to facilitate open and free access to these resources. This will also help avoid duplication of efforts in different States.
- Digital content, software applications and resources developed by private individuals, agencies or groups to be used in the school system will be subject to validation for accuracy of content and pedagogical suitability by organizations like NCERT, SCERT, and Boards of Secondary Education. A mechanism for procurement along with source code and rights will be evolved.
- Teachers and students will be oriented to prevailing copyright regimes, different types of restrictions on reuse of content and the need to respect copyright. Teachers and students will also be educated about alternate forms of licenses like the creative commons and encouraged to use them.

## **Enhancement of ICT Competencies of Teachers**

National policy defined the directives to enhance the competency of instructors and encouraged through it a movement of capacity building towards making the school system more ICT enabled. The competency training focused on teachers at two levels: In-Service and Pre-Service.

### **In-Service Teachers**

Policy directed In-service training of teachers will comprise of Induction Training as well as Refresher Courses. The induction trainings will be conducted by the Regional Institutes of Education of the NCERT, State Councils of Educational Research and Training (SCERTs) or such other institutions of the Central and State Governments and will preferably be completed before the commencement of the academic year. Refresher courses would entail keeping up with latest trends in ICT based teaching and learning in once a year to create a podium to interact and share the same. The induction training will be followed by teacher's evaluation to ensure that the minimum competency is achieved. In order to popularize the use ICT, the same should be integrated in the general training programmes at all levels and effective practices should be encouraged.

Online professional group/forums like English Teachers Association should be introduced to strengthen educational resources pool and actively contribute to the strengthening of domain specific knowledge within the country as well as provide a platform to start an initial sensitization through ICT operational skills and ICT enabled subject teaching skills. Development of Teacher capability in instructional design, selection and critical evaluation of digital content, and strategies for effective use of digital content to enhance student learning was suggested to be enhanced by increasing their participation in the creation of digital content previewing its wide spread usage in classrooms at different levels.

### **Pre-Service Teachers**

Pre-service teacher training was included in the policy to include a more comprehensive usage of ICT and supported technology to introduce the efficacy of using them in the process of dissemination of knowledge. According to the policy, Teacher educators will be suitably oriented and trained to use ICT in their pre-service teacher training programmes. Hence, all pre-service teacher education programmes will have a compulsory ICT component. The policy asked to revise existing curricula for pre-service teacher's training in accordance to include appropriate and relevant applications of ICT. All teacher trainees passing out of teacher education programmes will obtain adequate levels of competency in ICT and ICT enabled education. This proficiency will gradually form a part of the eligibility criteria for teacher appointments. The policy defined the pre-service teacher training and availability of ICT infrastructure in each such

training institution in ICT according to the guidelines mentioned in National Council for Teacher Education (NCTE) which would be responsible for its periodical revision.

### **Enhancement of ICT Competencies of Students**

The students are expected to be fairly familiar with computer and application related to Information and Communication Technology. National Policy provides guidelines on how to channel the infrastructure and resources to enhance the competencies of students in learning from effective usage of ICT infrastructure. The guidelines as mentioned earlier gauges the ICT competency at basic, intermediate and advanced levels out of which the third level emphasizes on every student to complete this stage before completing schooling. Highlighting the guidelines it suggests the following,

- A programme of ICT literacy will be implemented across all secondary schools in the States, both government and private within the XII plan period.
- A model Curriculum for ICT in Education (CICT) will be developed at National Level and States will be encouraged to adopt/adapt it.
- States will develop an ICT literacy curriculum and appropriate course materials mapped to the stages mentioned above for uniformity. These will be in the form of self-instructional materials, enabling students and teachers to process them on their own. The ICT literacy programme will endeavor to provide a broad set of generic skills and conceptual knowledge and not focus on mastering the use of specific software applications.
- The Boards of Secondary Education will develop a suitable scheme of Evaluation. ICT would be an additional subject together with the award of a certificate of proficiency.
- The ICT Literacy programme will be extended to the upper primary stage by the end of the XII plan period. However, States may take up this expansion earlier, based on resource availability and capacity of the system.
- A dedicated teacher with appropriate qualification will be engaged in each school. This teacher will also function as the ICT coordinator of the school where ICT literacy is to be imparted. With the growth of infrastructure in the school, a suitably qualified technical assistant may also be provided.
- All teachers in a school will be expected to become advanced users of ICT integrating ICT skills into their professional development as well as their teaching learning practices across all areas of the curriculum.
- States will initiate the process of launching/creating courses in different areas of ICT for the higher secondary stage. The courses will factor in the requirements of students of different streams, including academic and vocational streams.
- Courses will be modular in design to enable students to select appropriate software applications based on current needs of higher education and job prospects. Courses will



be revised frequently to keep pace with emerging trends in ICT. A Post Graduate teacher with appropriate qualifications to teach these courses will be appointed to teach the above-mentioned curriculum.

- An ICT Lab attendant/technical assistant with appropriate qualifications will be appointed to manage the ICT/Multimedia Resource lab.

### **ICTs for Children with Special Needs**

Ever evolving scope of ICT can extend to be the solution for increasing need to make education more inclusive in the country. Children with special needs encompass a variety of issues from particular impairment leading to learning difficulties to ones arising from the interactions in the classroom dissemination procedure. Although learning difficulties and impairment don't necessarily go hand in hand, role of ICT indispensably helps in catalyzing the goal of effective learning. National Policy recommends the following for enhancing ICT competencies in children with special needs,

- ICT software and tools to facilitate access to persons with disabilities, like screen readers; Braille printers, etc. will be part of the ICT infrastructure in all schools. Special care will be taken to ensure appropriate ICT access to students and teachers with special needs.
- All teachers will be sensitized to issues related to students with special needs and the potential of ICT to address them. All capacity building programmes will include components of ICT enabled inclusive education.
- All web based interfaces developed for the programme including digital repositories, management information systems, etc. will conform to international guidelines for accessibility.
- Accessibility norms will be adopted as per the World Wide Web consortium, W3C guidelines (Web Content Accessibility guidelines, <http://www.w3.org>) to enable the content to be accessed by children with special needs. Web based digital repositories with W3C compliance will address the lack of availability of resources for persons with disabilities. Digital content and resources, for the exclusive use of persons with disabilities, talking books for example, will also be developed and deployed.
- The absence of appropriate vocabulary for different subject areas in the different Indian languages and the unfamiliarity of the cultural context can make digital communication and resources inaccessible to students and teachers across the country. Efforts will be initiated to develop appropriate word lists and dictionaries in Indian languages and wide spread translations encouraged.

## **ICTs for Open and Distance Learning**

ICT provides potential for including bilingual, drop-out learners and reach interested students in the remotest parts of the country. It emphasizes on the shift from mass produced educational resources to customized support which addresses the needs of the globalised world through the means of teleconferencing and Online available self-paced contents (such as MOOCs). National Policy on ICT Education dictates the following regarding application of ICT in Open and Distance Learning,

- National and/or State level Open schools will be strengthened by harnessing ICTs innovatively. Access to e-books, digital learning resources, Digital Repositories (with relevant learning resources) etc. will be developed by these institutions as student support services. This will also be used for online capacity building for open and distance teacher training.
- All Open and Distance Learning Systems will be automated and provide online, all services including admissions, examinations, e-Accreditation and grievance redressal on the lines of the National Institute of Open Schooling.
- The proposed mentoring system for students involving expert teachers will be extended to these students also. Online courses, online on demand exams, and digital repositories and content, media broadcasts planned through DTH/Satellite based, open learning systems allowing multiple entry and exit points, opening out the school resources to non-formal students, guidance and counseling, will result in effective use of ICT for open and distance learning.

## **ICTs for MIS**

Management Information System (MIS) serves as an operational tool to manage the applications run by ICT in an organization with its database monitoring and reporting the functionality of ICT enabled technology periodically. In order to implement a uniform MIS across the nation, National policy recommended the following,

- States will adopt or adapt an e-governance and automated school administration programme for schools, build capacities for its implementation and deploy school based Management Information Systems (MIS). These MIS will be integrated with the proposed state wide web based School Education Management Information System.
- A school wide local area network enables automation of a variety of processes. Beginning with library automation, locally cached offline access to internet resources, office automation, maintenance of records, student tracking, resource planning, using the existing ICT infrastructure will increase efficiencies. At the same time, savings in cost, time and effort will also accrue. The school wide local area network will be used to facilitate this automation.

A school MIS should be a country wide network connecting schools, teachers, students, school managers and the encourage participation of the whole community. It will serve as a single approachable unit to obtain information related to the secondary school system which will facilitate the research and development of the institution along with guiding decision making regarding enhancing ICT competency for the institution. The scope of information is to be collated by the MIS will be broad and include student and teacher tracking, particularly for their academic needs. The norms will also define standards of technology including language fonts, word processors, technical dictionaries, etc. Open standards facilitating universal access to information, content and resources will be ensured.

## **Provisions for Managing and Implementing the Policy**

### **Programme Monitoring and Evaluation Group (PMEG)**

When the ICT policy is to be implemented on one of the largest schooling systems in the world, the responsibility of monitoring and management of the system should be well defined too. National Policy for ICT education outlines the formation of the Programme Monitoring and Evaluation Group (PMEG) under the aegis of Department of School Education and Literacy, Ministry of Human Resource Development, Government of India. The primary role of the group is to collaborate with the institutions and subject experts to develop norms, specifications, guidelines, evaluation reports and more in order to provide States guidelines in implementing the ICT programme.

### **Inter-Ministerial Group**

Formation of an Inter-Ministerial Group is also endorsed by the policy comprising of the Ministry of HRD, Ministry of Communications and Information Technology, Ministry of Information and Broadcasting, Department of Space, Department of Science and Technology, Ministry of Power, Ministry of New and Renewable Energy, Ministry of Labour and Ministry of Rural Development and other departments dealing with education to guide technological choices and offer cost effective and optimum infrastructure and connectivity.

The responsibility to review state of the art technology and compliance of infrastructure with the ICT goals along with feasibility of implementation, finance, environmental footprints of the same in the school sector. Regarding Technology choice reviews, it should include standards and norms for computer configuration, input and output devices like scanners, printers and projectors, operating systems and different software. Group is also responsible to provide norms for Edusat terminals and pricing of enabling infrastructure and periodically review ICT and education related issues emerging out of Acts and Policies in other sectors, particularly relevant to security, copyright and effective use of ICT and guide States accordingly.

## **National and State Level Agencies**

Institutes like the National Council of Educational Research and Training, the Central Institute of Educational Technology, the National Institute of Open Schooling, the State Councils of Educational Research and Training, the State Institutes of Educational Technology or any other public educational agency designated by the State according to the National Policy will develop curriculum, resources, and undertake capacity building programmes, which will serve as models for adaptation and implementation across the system. These agencies will come together to compile digital content, resources and tools and norms for quality, universal open access for different types of digital content as well as effectively manage EDUSAT networks to maintain the wider reach to the audience.

## **State's Participation in the ICT Policy**

As education is placed in the concurrent list of the constitution of India, the National Policy on ICT education defines the role of state government and relevant stakeholders to ensure the implementation is thorough. Policy defines the task for the States in a two-fold manner:

- Define norms, standards, guidelines and frameworks to implement the policy in an effective manner
- Facilitate and monitor the implementation of the policy in an effective manner.

The implementation of the tasks although would require the programme for action, a road map and a feasible timeline which should all be based on National Guidelines and relate to norms set by the same for infrastructure, implementation processes at various levels and capacity building programmes e.t.c. Framework should be developed by individual states regarding development, selection, evaluation, deployment in repositories and use of digital content. All the relevant stakeholders should be efficiently facilitated to promote their participation in the ICT programme and take their assistance in mobilizing the resources from private and community sources. Digital repositories and a legal and regulatory framework should be developed, deployed and maintained for their infrastructure including implementation of an appropriate capacity building framework.

The Programme for Action as mentioned earlier should be drafted by the States that will guide the functioning of ICT Programme in all the Government and Government aided secondary and higher secondary region schools in the region. The whole programme is to be extensive enough for covering till the upper primary stage ensuring that the development is carried in the private institutions at the same level too. State is provided flexibility to utilize past experiences and appropriateness to install an institutional mechanism and prepare designs for the implementation of the ICT programme by when required, delegating responsibilities at school level.

The States' Department of Education should designate an advisory group to perform multiple functions comprising guiding, monitoring and evaluation of the ICT programme in the State. The group should consist of a reputed engineering institute of the State, University Departments and other concerned departments. They should also be ensuring about the connectivity and electricity among the schools which could be offered at negotiated norms for pricing, quality of service and maintenance. The states should adapt the norms discussed at the national level for the all aspects of the ICT implementation to keep up the uniformity, optimum utilization and high standards of ICT in the State. The State should work towards minimizing the avoidable upgradation and generation of electronic waste and should draft SLA for procurement, installation, operation and maintenance procedures and draft appropriate agreements with the vendor/ agency.

Models for ICT Infrastructure suggested by the National Policy states Build, Own, Operate and Transfer (BOOT) models to enhance reach of the programme in a brief span of time. In order to avoid out of date equipment in schools, they can experiment with combinations of equipment and manpower based on the feasibility and availability of the resources to them. The States are asked to enhance regular teachers' capacities and except for the +2 grade phasing out of a separate teacher is required. Without compromising existing ICT programmes States should seek to extend education to train youth after school hours where it is possible to establish appropriate community partnership models for optimum utilization of infrastructure keeping in check the safety of school property.

In order to monitor the risk of inappropriate content reaching the children via Internet or chances of compromising one's privacy or identity it is important for the State to customize advisories for regulatory access and educating the users regarding these issues. Head of the institution and teachers should be trained about appropriate regulatory measures too. Incentives can work as a strong motivating factor for the teachers, students and schools to recognize, showcase and promote initiatives and talent. States can also look into Partner/Sponsorships with Banks, Corporations and Charitable Institutions regarding accessing easy loan schemes for obtaining ICT equipments, awards and various professional support packages.

### **Financing and Sustainability**

The efficient allocation of the resources is necessary for proper utilization of ICT resources and it can be achieved by Central and State sponsored schemes which are supplemented by public, private and corporate partnerships. States should maintain a directory of the volunteers, resource persons and support institutions for facilitating their participation in the ICT programme. It is the responsibility of every school to customize an ICT plan, based on the learning needs of the students and training requirements of the teachers and administrators in a cost effective manner. The plans designed by the schools need to be reviewed at District and State level to ensure that it follows the guidelines, standards and norms set by the government and for maintaining the total cost of operations low and optimizing investments.

## **Monitoring and Evaluation**

State advisory group as mentioned above plays a key role in the monitoring and evaluation of ICT resources and planes, they will perform this duty by identifying the criteria, performance measures and periodicity of monitoring and methodology that is adapted by the reporting institution. Adopting a hierarchical model in monitoring of the mechanisms run under the flagship of IC programme, every school is asked to devise a School Education Management Information System (SEMIS) and DISE that would look over the school's initiative while the reporting of the progress and achievement is done to the State Advisory group which is monitored by National level agencies.

An independent third party evaluation of the programme will be undertaken at particular stages in the project. This agency will be identified by the State and the criteria for evaluation would be structured on the topics related to policies of the ICT Programme, infrastructure, digital resources, capacity building and the overall management of the programme. The reported results would be disseminated widely to promote best practices and promote these practices among other institutions.

The policy needs to be updated and revised based on the change in circumstances in the region and institutions every two years. This change is brought upon by consulting all relevant stake holders including but not limited to Inter-Ministerial, the States' advisory groups, the monitoring and evaluation findings, the programme monitoring and evaluation group.

## **State ICT Policies**

The country currently constitutes of 29 states and 7 union territories out of which 3 states have customized the National ICT policy based on the circumstances in the State and their literacy needs. Bihar, Orrisa and Tamilnadu have formulated their state policies in line with the National Policy which will be illustrated as below.

### **Bihar**

ICT vision of the State involves an endeavor for rapid expansion and growth of knowledge based economy in the state and to bridge the digital divide which separates the citizen in urban areas from those in rural areas by creating an unparalleled IT infrastructure & deliver online services to every citizen in the state. ICT policy is broadly divided at two levels: School and College. As per the policy published in 2011, the scheme is providing aid to 619 middle schools which was proposed to extend to 1000 schools in 3 to 5 years phase by phase.

## **School**

CAL under the aegis of Sarva Shiksha Abhiyan (SSA) works towards aiding the school organize interactive education to children of classes from VI-VIII through the virtue of computers. In addition to the interactive education, all Government and Government aided Secondary and Higher Secondary Schools will provide basic computer literacy courses through a computer lab with broadband internet connectivity reaching almost 1000 schools which was proposed to be able to cover almost all the schools in the state within the span of 2 years.

State policy states that the Government will take up intensive computer training of at least 10% of teachers in Higher Secondary Schools and progressively train at least 2-5 teachers in all other schools. Schools would be introduce IT in all the subjects from the Higher Secondary Level and in order to promote it further separate special classes comprising Project Management, Project Development and Software Skills would be introduced. State government urged stakeholders to identify knowledge partners that would help in designing IT curriculum to be applied at school and college level promoting primarily soft skills like communication skills and personality development. State Government proposed to design the infrastructure and reserve the rights of girls and various categories of differently enabled persons by considering them for special preference for their admission to IT courses.

## **College**

State policy has made the accessibility to the about 400 e-courses designed by faculty of IITs and IIS Bangalore under the National Programme on Technology Enhanced Learning which is made available to the University level students through the Virtual Classrooms enabled with 1 GB connectivity provided under the National Mission on Education through Information and Communication Technology (NME-ICT).

Constituent colleges and Universities were prepared to be installed with Computer Labs which has according to the report provided in the year 2011 has reached 14 University and this initiative was proposed to connect all the colleges/universities under NME-ICT project by 2015.

The need to enhance the R&D to increase the impact of ICT in education was identified by proposing that the relevant stakeholders should be able to recognize the focus areas of research needed in the ICT area. In order to promote the researchers employed in this field, appropriate scholarships would be provided to deserving candidates from Bihar to take up Doctoral and Post Doctoral research in the ICT area.

### **Bihar Knowledge Society (BKS)**

Bihar Knowledge Society would be responsible for developing 5 IT Training centres per district in order to impart computer literacy and certificate courses (short, 6 months) to provide opportunities for unemployed educated youth in various IT skills in PPP mode. These centres would receive appropriate funding from the State Government.

### **Centre of Excellence for IT**

Technical Education Quality Improvement Program (TEQIP) would aid in setting up of technical institutes in the State which would also be developed into Centre for Excellence for IT. This initiative has reached 46 colleges that have adopted the neighbouring ITI and Polytechnic institutes under its umbrella.

### **Other Thrust Area**

It was proposed in the State Policy that the institutes will design IT courses/training modules for the accounts, commerce and any graduates so that they can stand eligible for employment in high end Knowledge Process Outsourcing Industry. The State proposed to setup EDI & SME knowledge & Technology Centers to create skill developments and establish an international level institute for IT Education and Training to assure rapid development of IT in the state.

### **Orissa**

The Department of Information Technology, Government of Orissa released an official resolution in 2004 regarding Information and Communication Technology Policy for the State. The vision of the state comprises of well planned, robust and futuristic IT architecture in the State and has dedicated a section in the policy document to Education and Training.

### **Computer Education at Schools**

Schools under the State Policy would be provided starting from the primary level and State would ensure that all school children are considered under the computer training program through appropriate initiatives. Teachers would be provided with up to date proper training on computer usage and IT applications and special training will be given to the teacher in-charge of computer education under multiple schemes.

It is mandated by the State to enable all the Universities and Colleges in the State to be connected via Wide Area Network and Internet. This connectivity will be employed to provide online education, career counseling, online selections and interviews and such relevant tasks.

It has been urged in the policy that the IT education and training provided by the institutions and training houses in the State would be following Industry friendly curriculum and the consultation for the same would be drawn from the Academia and Industry. Including Entrepreneurship Development Programme would become a part of the school and college curricula to ensure the compatibility of the education that is imparted in higher educational institutes and the contemporary job culture.

Government has emphasized on the maintenance of Manpower planning on a continuous basis for IT services available at the institutes. The state government would monitor the existing capacities available with various technical institutions in the State on IT related subjects.

### **Tamilnadu**

Tamilnadu released its state's ICT policy embracing the vision that it shall be the ICT hub of South Asia by creating a knowledge driven ecosystem, leveraging entrepreneurship and promoting socially inclusive growth to achieve a 25% production share of the Indian ICT industry.



The role of ICT in Research and Development has been emphasized in the policy where institutes in the state were asked to focus on fundamental and applied research in the ICT sector. Students opting for pursuing research in Doctoral and Post Doctoral courses in the ICT area would be provided with incentives. The State Government would help facilitate the collaboration between the educational institutes and industries to identify the pressing area of focus and provide incentives to outstanding students. Government has also extended to collaborate with industries to establish and upgrade labs and research parks in existing institutes focusing on specific research initiatives.

### **Emerging Trends with regard to National and State Policies**

National Policy on Information and Communication Technology in School Educational plays a pivotal role in defining the role of ICT in the educational scenario of India and providing a roadmap of the potential that can be realized with effective planning and implementation at Central and State levels.

The pedagogical transformation that ICT can present in the learning environment is phenomenal by providing learners to have access and editorial privileges to idea and educational content.

Paradigm shifts in Model, Focus, Role of learner and Technology have been observed in the educational environment. This has presented the opportunity to all the students to become adaptive with the reformed curriculum than just being an active participant.

It is apparently visible that the National Policy for ICT in education outlines every minute aspects involved in the planning and execution of ICT in the curriculum whereas out of the 29 states and 7 union territories, only 3 states have taken the initiative to define the position of ICT at their level. For the pace that Information and Communication Technology is evolving, the status of inclusion of ICT in all the States' and Union Territories' policy calls for a prompt recognition.

It is commendable that the State policy about ICT research and efforts regarding Capacity Building at School and College levels are encouraging. However, the same should also be further extensively described to include the aspect of infrastructure and Digital Resources that may suit the regional needs as well as the specific responsibilities of the State's advisory group and related monitoring initiatives.

## Abstracts of Researches

ICT as a revolutionary force has been recognized to be included in mainstream pedagogy whether it's incorporated in curriculum dissemination or if it's used in acquainting teachers with appropriate training to translate theoretical knowledge into more comprehensible mode of learning.

### **Researches focused on ICT integration into mainstream pedagogy of the institution.**

**Kumar, R. (2015).** Effectiveness of computer assisted instruction as remedial teaching for learning disabled children. Unpublished Ph.D. Thesis, Chaudhary Charan Singh University

Among the different categories of children with special needs, children with learning disability form an important and emerging area. Learning disability constitutes the most rapidly growing area in special education. The term 'learning disability' as first used in 1963 by Prof. Samuel Kirk to describe students having difficulties in schools who had no other obvious disability. Although there is no universally accepted definition, students with learning disabilities exhibit significant academic difficulties that cannot be attributed to any other special education condition and that cause them to need extra assistance to be successful in school. A variety of characteristics have been identified in students with learning disabilities, but the most common is a specific and significant discrepancy between ability and achievement in at least one area of academic functioning, learning disabilities are also called sometime as 'hidden handicap' because children with them often have strengths that mask weakness in specific areas. Different types of instructional approaches and teaching tactics are used by teachers and other professionals to help students with learning disabilities to be successful in school and in life. The findings of the study provide the awareness to the teachers, parents and guardians of learning disabled children. The educational implications of the findings of study are as follows: 1. All games and simulations may be used for helping the learning disabled children because in CAI package, all games and simulations are easy to download and supported almost all the operating systems. 2. The findings of the study may be developing the tendency of practices, trial and error habits in students. 3. It was found that the CAI package may provide to be effective but is not the panacea for students with learning disabilities. 4. The findings of the study that CAI package may improves the thinking process of learning disabled children can also be useful in providing the ways to teach for learning disabled students. 5. The findings of the study reveals that the CAI package may be helpful in making teacher awareness to teach as teaching material. The teachers may be used the selected games and simulations as a teaching material to improving the performance of students. 6. The findings of the study may be helpful to identify the learning disabled children in classroom and but CAI package is useful for student for class II-IV.

**Trivedi, M. C. (2015).** A study of ICT awareness need and use among secondary and higher secondary school teachers of saurashtra region of Gujarat. Ph.D. Thesis, Saurashtra University

The investigator has taken the proposed study to know ICT awareness, use and need of secondary and higher secondary school teachers of Saurashtra region. It will also help the investigator in term of feasibility of conducting the study. Further, keeping the time factor in mind, the investigator has decided to limit the study only to the schools of Saurashtra region. Even very few research studies have been conducted in this regard to know the ICT awareness, use and need in different dimensions, like, for academic development, professional development and personal development. The present study may through some light on these matters. Hence the present study is an attempt to know the ICT awareness, use and need of secondary and higher secondary teachers. There was a low degree of awareness of secondary and higher secondary teachers in computer, internet and other components of ICT. 2. There was a low level of usage of ICT resources by the secondary and higher secondary teachers. 3. Majority (44.51%) of the teachers told that they were not using ICT resources due to lack of skills. 4. Secondary and higher secondary teachers have shown low level of need for ICT for their knowledge and use. 5. Medium of Instruction at Secondary level of the secondary and higher secondary teachers was found not related with the ICT awareness, use and need of the teachers. 1116. Type of School where secondary and higher secondary teachers were teaching was found significantly related with their ICT use. Private school teachers were found more in ICT usage in comparison to that of the private aided school teachers. Whereas, the same variable was found not related with the ICT awareness and need of secondary and higher secondary school teachers. 7. Age was not related with the ICT awareness, use and need of secondary and higher secondary teachers. 8. Gender was found not related with the ICT awareness, use and need of secondary and higher secondary teachers. 9. Stream was found not related with the ICT awareness, use and need of secondary and higher secondary teachers. 10. Degree was found related significantly with the ICT need of secondary and higher secondary teachers. ICT need of graduate secondary and higher secondary teachers was lower than that of the post graduate teachers. Whereas it was found not related with ICT awareness and use of secondary and higher secondary teachers. 11. Training of teaching was found not related with the ICT awareness, use and need of teachers. 112 12. Designation was found not related with the ICT awareness, use and need of teachers. 13. Marital Status of the teachers was found not related with the ICT awareness, use and need of teachers. 14. Category was found not related with the ICT awareness, use and need of teachers 15. Teaching Experience was found related significantly with the ICT awareness of secondary and higher secondary teachers. That is less experienced teachers more aware about ICT in comparison to more experienced teachers. Whereas it was found not significant for the ICT use and need of secondary and higher secondary teachers. 16. Total salary was found related in case of ICT awareness and use of teachers. That is less salary paid teachers know more or aware more about ICT than the more salary paid teacher and their degree of use of ICT was more in comparison to the more salary paid teachers, whereas it was not related with the ICT need of secondary and higher secondary teacher. 17. Level of teaching was found not related with the ICT awareness, use and need of secondary and higher secondary teachers. 113 18. Teaching subject was found not related with the ICT awareness, use and need of secondary and higher

secondary teachers. 19. Medium of Instruction at higher secondary level was found not related with the ICT awareness, use and need of secondary and higher secondary teachers. 20. Computer training was found related significantly with the ICT use of secondary and higher secondary teachers. That is computer trained teachers use more ICT resources for their classroom teaching, professional development and personal development than the computer untrained teachers. Whereas it was not related significantly with ICT awareness and need of secondary and higher secondary teachers. 21. Possession of Personal Computer was found not related with the ICT awareness, use and need of teachers.

**Balaji, S. (2014).** Effectiveness of ICT in the education of Visually challenged children. Unpublished Ph.D thesis, Tamil Nadu Open University.

The society is fast changing with technological advancements. Special children cannot be left behind. Mastery over the content matter alone is not sufficient. The academics should have a sound knowledge in various educational technologies available for the people with disabilities and the necessary skills in using them in the teaching – learning process. The researcher analyzed various technologies used for visually challenged students and their limitations. In Tamil Nadu most of the schools use Braille. Very few schools use some other technologies; in particular JAWS for teaching visually challenged students. This study was conducted to find out the effectiveness of ICT in the education of students with visual impairment in Tamil Nadu. The purpose of this study was to investigate whether there is significant difference among the experimental group which is taught with ICT and those who are taught in the traditional Braille method. It was also aimed to investigate the significant differences among the sub groups of the experimental group with regard to age gender, socio economic status, locality, ICT awareness, community, religion, nature of blindness, type of blindness, etc. The study has proved that ICT is effective in the education of the children with visual impairment and its relationship of effectiveness with other categorical variables. It found that there are significant differences among various sub groups, meaning that the ICT is effective for some groups and not so effective for other groups.

**Kaur, R. (2012).** Effect of computer assisted instruction CAI on achievement and attitude towards science in relation to cognitive style at elementary school level. Unpublished Ph.D Thesis, Kurukshetra University.

Cognitive learning style of the student has been found to have potential and great implications for the educational process (Sternberg & Grigorenko, 1997) and is described as a model in which students approach, acquire, organize and process the information. According to Witkin, et al. (1971) and Witkin & Goodenough (1981), cognitive learning styles are the consistent manner in which an individual perceives and carries out intellectual activities, memorizes and retrieves information. Though, CAI has been found to be effective in individualized tutorial form and also as supplement to the conventional teaching but unfortunately many CAI programmes have neglected cognitive learning style and the processes of how student learn. Understanding of

students' attitude is important in supporting their Achievement and interest Towards a particular discipline however, earlier research studies focused mainly on Science in general (Dawson, 2000) and less attention was paid to specific branches like Biology, Physics or Chemistry (Salta & Tzougraki, 2004). Thus, in the light of the observations made above, the objective of the present study was to make an investigation of the effect of CAI on the academic Achievement and Attitude towards Science of field dependent and field independent students. The study showed that the use of individualized CAI just like any other new technologies improved the academic performance of students in the teaching and learning of Science, and that gender has no effect in the use of CAI among the students. However, cognitive style of the student does interfere with their 109 performance. Where field independent students can learn independently through CAI, field dependent students need help of the teacher/mentor and perform better in conventional classroom teaching. CAI brings positive change in students' Attitude towards Science hence develops students' interest in subject. Based on these findings the following recommendations were made: 1. Since this study showed that individualized form of CAI enhance the academic performance of the student, so, CAI should be utilized to improve quality of education at school level. 2. When instruction is administered in accordance to the cognitive style of the learner, their academic Achievement can be enhanced. 3. Presence in the Science classes can be increase by proper utilization of CAI in student centered approach. 4. Teachers should be trained to properly integrate computers in their daily classroom processes. 5. The Government and non-government agencies should equip both urban and rural schools with computers and new technologies for easy access by both teacher and student. 6. There should be a provision of regular supply of electricity to schools at all times. 7. Teachers in schools should be given free and compulsory computer training to enable them use these new technologies when supplied to them. 8. Teachers should be motivated to prepare CAI of their own keeping in view the requirements of the students/classroom. 9. There is a need to conduct more studies on Computer Assisted Instructional techniques over large student sample for an extended period in different subjects and stages of schooling. 110 Further, studies need to be done from rural and urban areas, different socio-economic status and ability groups. 10. There is ample scope of incorporating recent technologies to include animations, simulations and interactive technologies to improve the effectiveness of the CAI technique.

**Sisiliya, K. (2011).** Efficacy of instructional methods and materials prepared and used in the selected schools of Manipur state. Unpublished Ph.D. Thesis, Avinashilingam Deemed University for Women

The application of instructional package in classroom has a great impact on teaching learning process. Among the three methods, computer assisted instruction is the most effective method followed by learner-centered teaching method and visual aids. Focusing on the principle role of instructional methods and materials, it has significant value in the improvement of the quality of teaching learning process. The results of the present study point out that the application of instructional package as supplementary strategy in teaching social studies was found to be

effective and significant because the developed instructional package increased the interest and enhanced the motivation level of students. It was found to be equally effective for both low achievers, high achievers and average. The conclusion is evident that the computer assisted instruction (CAI) is the most effective method followed by learner centered teaching method and visual aids for teaching social studies at secondary level. Such educational materials can serve as either alternative or supplementary material to direct teaching. Therefore, the efficient use of instructional method and materials should be ensured at all the levels of education. The instructional method and materials can have an enormous effect on the academic performance of students if the standard quantity and quality of instructional material items are properly allocated, equalized per student and efficiently used.

**Sirohi, S. (2009).** A study of effectiveness of Computer assisted instruction followed by various teaching methods in terms of achievement of secondary school students. Unpublished Ph.D. Thesis, Chaudhary Charan Singh University.

In the present study, three methods of science teaching were compared after CAI. For this purpose students of class VII were taught by those methods separated. Achievements scores of the students before and after the treatment of these methods were measured. On the bases of the findings of the present study out of the three teaching methods of science at secondary level that is CAI followed by discussion method, CAI followed by demonstration method and CAI followed by activity method. The most effective teaching method in class room setting is the CAI followed by activity method for both boys and girls. it can be concluded group wise that CAI followed by activity method was found most effective method for teaching science to secondary school students and CAI followed by discussion method was found less effective than CAI followed by activity method but, was found only little more effective than CAI followed by demonstration method. This study provides knowledge about the suitability of different teaching methods used in science teaching. This study also provides awareness of different teaching methods of science to the in-service teachers and they may utilize this knowledge to look into and modify their teaching methods.

### **Researches focused on Attitude of teachers towards using Information and Communication Technology.**

**Siddiqui. J.S. (2017),** A Study of Perception of Teachers and Students towards e-Pathshala, Unpublished M.Ed. Thesis, Department of Educational studies, Faculty of Education, Jamia Milia Islamia, New Delhi

The study intends to know the perception of teachers and students towards e-pathshala and to analyze and to analyze the both positive and negative aspects of e-pathshala on learning. Two KV schools were selected as sample in which teachers and students were using e-pathshala. All of the participants responded with favorable responses regarding the usage of e-pathshala among which most faced connectivity issues while accessing e-pathshala. E-pathshala was deemed

useful with regard to benefitting self-learning, concept clarification and making the content interesting. Students mentioned benefits like making educational resources more feasible and helping them with acquainting with the subject matter ahead of time.

**Ghaus G (2017)**, ICT Usage In Madrasas: A Study Of Al-Jamiatul Ashrafia, Mubarakpur, Master of Education Thesis, Department of Educational Studies, Faculty of Education, Jamia Islamia University

There are both advocates and detractors of madrasa education, former make a connection between religious extremism and religious education and thus accuse madrasas of being threats to national security and later argue that till now there has been no conviction of anyone from within the madrasa system in terror related activities and defend the system to be a part of independence revolution. However there has been a significant amount of criticism attributed to the unconventional curriculum followed by the madrasas and in order to address the contemporary trends followed by these institutions to modernize education the present study was conducted. One institution AL-JAMIATUL ASHRAFIA was considered with 10 teachers and 100 students to be the sample for the study. Checklist, Questionnaire and an interview schedule was designed for the study to assess the availability of resources, to assess the ICT skills and usage by students and teachers. It was found that the ICT resources such as desktop computers, laptop, digital camera, printer, scanner, projector, audio equipments and internet connectivity were available along with the madrasa's own website. However, 60% teachers weren't acquainted with any course in ICT but most were proficient in MS Word especially in Inpage Urdu software. Almost all of the teachers had developed content related to classroom presentation. Results showed that 61% students were very confident in various basic computer skills. Social networking sites were found to be very popular with regard to web engagement and sharing relevant education. Among the pool of participants, most expressed that they use internet daily and 1 to 3 hours daily among them used online sources to search for information.

**Hasan T. (2017)**, A Study of Perception of Teacher-Educators and Student-Teachers towards use of ICT in Urdu Medium, Unpublished Master of Education Thesis, Department of Educational Studies, Faculty of Education, Jamia Milia Islamia, New Delhi

Keeping in mind the importance of ICT, ICT has been included in B. Ed. And M. Ed. Program as a subject to enhance the professional capacity of student-teachers in teaching-learning process, material development, developing collaborative network for sharing in learning. At present scenario we come across that the ICT is largely used in teaching of English medium and in teaching of other languages and subject making teaching-learning process very easy. But in the field of Urdu medium, ICT is rarely used that considered is big tragedy. Sample consisted of 2 teacher training institutes (Jamia Milia Islamia and Al-Flah University) for observation and analysis. Findings of the present study yielded that all teacher educators like to use IT in teaching because it creates opportunity to share study materials and experiences as well as facilitates collaborative work between students, increase insight and understanding among students. There

has been mixed views reported on the behalf of Teacher-Educators regarding usage of ICT in preparing exam paper and result, online video conferencing, developing teaching resources, seminar paper and online interview. Almost all student teachers favored ICT tools to improve teacher learning process and explained that concept could be better understood through use of ICT. Only half of the students received feedbacks from their instructors through email communication and all deemed online sources to be useful for admissions and scholarships related information. There was an apparent lack of facilities and professional ICT training to Teacher Educators.

**Alam Q. (2017)**, Use of ICT in Political Science: A study of perspectives of teachers and Students of Senior Secondary Schools in Delhi, Unpublished Master of Education Thesis, Department of Educational Studies, Jamia Milia Islamia, New Delhi

The need for conducting this study stems from its contribution of knowledge, particularly its generation of useful information to support future development in the use of ICT Political Science in senior secondary schools. The present study investigated perspectives of 5 teachers and 80 students limited to eleventh grade (Arts Stream) of South Delhi using convenient sampling. Qualitative analysis of the data revealed that in terms of using internet and other ICT as a resource for lesson preparation, most of the students rarely use it, while very few used the internet to gather information regularly. The few teachers particularly felt that they had both access and training inadequacy and hence were unable to utilize internet and other facilities. The interest in pursuing training to hone the ICT related skills was found both in teachers and students. Very few strong examples of integration of ICT into classroom teaching learning of Political Science are visible, though very few schools do use the ICT tools and integrate teaching of some lessons of political science with ICT tools; it is usually an information source than a part of core learning process.

**Viju, M J (2016)**, Application of ICT Information Technology and Communication in Communicative Language Learning, Unpublished Ph.D. Thesis, Mahatma Gandhi University

The thesis discusses the application of ICT in English Language teaching, especially in Communicative Language Learning at higher secondary level in Kerala. By using survey and experimental method, the research arrived at the finding that incorporating ICT into the curriculum as mentioned here can improve the writing, reading, speaking and listening skills of learners besides supporting their creativity and independence in learning by the use of collaboration and reflection.

**Hariharan, R. (2015)**. Impact of Six Sigma–DMAIC approach in learning the concepts of ICT education by secondary teacher trainees (Doctoral dissertation, Manonmaniam Sundaranar University, Tirunelveli).

In pursuit of quality, educators are continuously engaged in a process of finding opportunities for improvement of the learning process, the quality of learning experiences and the way education



is delivered. A special focus can be made on the use of the basic quality tools by educators to solve problems and to improve the quality of the learning process in courses at higher education institutions particularly in the teacher education. This study reveals that Six Sigma based DMAIC technique can improve the quality learning process of the secondary teacher trainees. It is in concurrence with the findings of Chlaidze & I. Linde (2006) who reported that the Six Sigma pertains to improving the quality of matter taught, the character generated of the students, and the quality of study and student's life. They have also measured the Lecture quality and the quality of learning materials. Their research work treated DMAIC, one of the sequences of the Six Sigma methodology, and provided an overview of the statistical toolkit for improving the teaching quality. The current study reveal that the control chart can show the common cause for variation in the achievement tests formed due to the lack of cognitive, reading, note taking and writing strategies. It is concurrence with the findings of Mirko Savic (2006) who indicated that a control chart can reduce the common cause variation which is usually a student's responsibility, for instance, poor preparation for exams, concentration, tiredness, etc. Further, they have stated that, a control chart can reduce our chances of making possible errors. The present study established the strategies to eliminate the learning defects by the control chart in teacher education. It is in concurrence with the results of the Durga Prasad, Venkata Subbaiah and G.Padmavathi (2012) who proved that the control chart help to monitor the processes in the engineering education system. The current study asserts that the RTY value of achievement test is influenced by the various psycho – somatic factors. It is in concurrence with the findings of Keith Hargrove and Legand Burge (2002) who affirmed that the RTY value of retention of Engineering students is influenced by financial aid, faculty – student relations and by academic preparations which are most prevalent.

**Saini, S. (2015).** Ph.D Thesis. An exploratory study of use of ICT by teachers in relation to their morale attitude towards ICT and technology competence.

It has been reported that if teachers already have negative perception towards the use of technology, this may affect not only their teaching effectiveness but more importantly they may become incompetent in using technology. The act of teaching along with high teacher morale, positive attitude towards ICT and technology competence enforces the teacher to use ICT productively to enhance the effectiveness of teaching and learning process for giving the best output from the curriculum in the limited time in hand. It is important to evaluate teachers' attitude towards ICT and their technology competence as ICTs are being implemented in both private and government schools. Thus it is essential to investigate the impact of their attitude and competencies towards ICT in determining the success of educational system. Sample consisted of 200 Secondary School teachers from 40 private secondary schools in Haryana. Scales, Opinionative, ICT attitude scale and Technology competence scale was used as tools in the study. Majority of the teachers of selected secondary schools of Haryana were found to be at moderate level in their use of ICT and approximately the same number of teachers were in low and high level of use of ICT. The results indicated that use of ICT by female teachers was

marginally higher than their male counterparts. The reason could perhaps be that they had more command over their subject. Their confidence level and healthy relationship with the staff and students could be another contributing factor towards better performance. Percentage of teachers with high level of morale was comparatively higher than teachers with low morale. This may have been due to ten factors viz- teacher rapport with principal, satisfaction with teaching, rapport among teachers, teacher salary, teacher load, curriculum issues, teacher status, community support of education, school facilities and services and community pressures used for defining secondary school teachers' Morale. Results also indicated that there exists no significant difference between gender and morale of teachers. The present study on the basis of attitude towards ICT revealed that the majority of the secondary school teachers' attitude towards ICT was neutral. Results of the present study showed that the teachers' attitudes towards ICT were the principal determinant of effective ICT use in classroom. The teachers with high level of technology competence made use of ICT more. This could have been due to teachers' personal feelings. While the schools encouraged ICT use, the real take-up depended largely on teachers' skills and attitudes to IT in general.

**Afsana, Ayesha (2014)**, Information and communication in education, Unpublished Ph.D. Thesis. Assam University

The study formulates the research problem on the basis of an extensive survey of the literature and draws inferences from analyses of the field data collected by administering structured interview schedule to the sampled 495 students studying in the higher educational institutions of Silchar town. The units of the study were selected from the universe of the students in Silchar town with the help of stratified random sampling technique. The collected data were organized and analysed through bi-variate and multivariate tables. The analyses were placed in the context of socio-economic and academic background of the respondents as well as socio-historical development of Silchar town. The socio-economic background of respondents includes family structure, religious, linguistic groups, etc. in Silchar town. Most of the male and female students belong to the General class category and the age group of 18-23 years. They hailed from both the rural and the urban settings of the north-Eastern region, and majority of them know languages like Hindi, English, Arabic and Assamese, including their mother tongues.

On the whole, ICTs have become important tools for learning among the minority students, particularly the Muslim students. The students use these tools for their learning activities. Internet, mobile phone and the satellite television are the major ICTs used in the teaching and learning activities of both the rural and the urban students studying in the higher educational institutions in Silchar town. In order to prepare students more effectively to 262 participate in ICT-driven education, greater commitments and willingness to share and adopt innovative solutions are needed from all aspects of society such as governments, private sector, communities, donors, parents and students. Higher educational institutions should be transformed into active learning environments open to their communities. Telecommunications

and power infrastructure policies should focus on these institutions as starting points for social change.

**Anitha, M. (2013).** A study on the perceptions of teacher educators towards the application of computers in teaching learning process, Unpublished Ph.D thesis, Andhra University, Vishakapatnam

Computer Education has become a compulsory subject in Teacher Education and both teacher educators and student teachers started using computer education in all areas of teacher education. During the use of computers in teacher education, it is observed that both from the context of facilities, awareness, skill, applications and evaluation the teacher educators always felt sensitive in integrating the computer education. Hence it is felt that this study on perceptions on the application of computer education in teacher education is taken up. The findings of the research that the teacher educators could visualise the availability and the extent of computer education in teacher education institutions. It is found that teacher educators have good computer operational skills but the facilities to apply and integrate computer education in teacher educational institutions is very nominal. The facilities available in the college for presentation and actual use of computers are highly different. In limited sense only the teacher educators are utilizing internet in their day to day academic updates. Using of computers in the evaluation process is also very minimum, at the most they are using for tabulating the marks and grades of the students.

**Azimi, H. M. (2013).** Readiness for implementation of e learning in colleges of education and assessment of e learning needs among its faculty members and students. Ph.D Thesis, University of Mysore

Study aimed to assess readiness in e-learning implementation with respect to ICT infrastructure, human resources, finance, psychological and content from point view of heads/ principals of the colleges of education and analyze needs on e-learning components, e-skills knowledge of faculty members and students of B.Ed. colleges affiliated by University of Mysore in Karnataka state of India. Numbers of Education Colleges as sample were 35 which have been distributed in different districts; Mysore city, Mandiya, Kollegal, Acetate Town and Hassan districts. Criterion variables included; readiness for implementation of e-learning and needs assessment. Also background variables covered; gender, types of institutions (Governmental /Private aided / Private Unaided), different teaching learning subjects (Science/Art/Language), level of education (UG/PG/Doctorate) and Length of experience in years for faculties. Three different questionnaires (readiness for implementation of e-learning questionnaire, faculty members' learning needs questionnaire and students' e-learning needs questionnaire) were made by researcher. Sample size to represent for heads/principals were 31, for faculty members were 186 and students were 346. All three tools were in English language but they become translated to Kannada language (local language of the Karnataka state) also. All tree questionnaires were

validated to check on face and content validity scanned and reviewed with the help of 8 experts before pilot study. A pilot study was conducted on a sample of 31 questionnaires for readiness tool, 45 faculty members and 45 students. The reliability of the tools were established with Cronbach Alpha Coefficient method for all the questionnaires, found to be satisfactory; .6532 for Heads/principals, .9138 for faculty members and .8980 for students. The survey took 24 weeks to complete from June to December 2012. The results were analyzed by PASW Statistics 18 and interpreted using the statistical techniques of independent samples t test, one way ANOVA, Duncan. Seven hypotheses were developed for this survey.

In hypothesis related to readiness for implementation of e-learning it was found that “There is no significant difference between the following categories of teacher training colleges with reference to their e-Learning implementation from point view of heads/principals” with respect to ICT infrastructure readiness, human resources readiness, budget and financial readiness, psychological readiness to implementation of e-learning, content readiness to implementation of e-learning. After analysis of related questions it was found to be same for all types of institutions as the observed contingency coefficient to be non-significant. In hypothesis related to faculties it was found “There was no significant difference between/among the following categories of faculty members with reference to their e-learning system components needs, current level knowledge and needs on e-skills” with respect to gender, length of experience, level of education, types of institutions and different types of subjects revealed none significant difference/influence by various selected demographic variables. But for type of institute the test revealed a significant difference in the mean scores of knowledge in e-skills of the faculties working in different types of colleges. It is evident that those faculties working in private-unaided colleges had significantly higher knowledge compared to teachers working in government and private-aided colleges. Also faculties teaching different subjects differed significantly in their current e-skills knowledge scores as the obtained in test scores, it was found to be significant The mean knowledge scores of the faculties teaching science, arts and language revealed that those with arts subject had least knowledge scores and those faculties who were teaching science had highest scores and language faculties in between. In hypothesis related to students it was found there was no significant difference between/among the following categories of Students with reference to their e-Learning system components needs, current level of knowledge on e-skills and needs on learning in e-skills with respect to gender, type of institutions and different types of subjects. But in different types of subjects mean values with different superscripts are significantly different from each other as indicated that those students studying in arts and languages had least knowledge scores and those students who were studying in science stream had highest scores and language students in between.

**Sree Rekha, R. (2007).** Attitude of secondary school english language teachers towards the use of ICT in teaching english. Ph.D Thesis, Manonmaniam Sundaranar University

The main objective of the study was to identify the attitude of secondary school English language teachers towards the use of ICT in teaching English.

Majority of the secondary school English language teachers (90%) have a positive attitude towards the use of ICT in teaching English. Of the 90 per cent, the attitude of 53 per cent of teachers is positive to a great extent and the attitude of 37 per cent is positive to some extent. Only 10 per cent of teachers reported to have negative attitude to the use of ICT in teaching English.

2. Gender has no influence on the attitude of secondary school English language teachers towards the use of ICT in teaching English. Gender wise comparison ( $t = 1.15$ ;  $p > 0.05$ ) revealed that there is no significant difference in the attitude of male and female secondary school English teachers.

3. Locality has no influence on the attitude of secondary school English language teachers. Conclusions follows that management-wise comparison of the attitude of secondary school English language teachers reveals no significant difference in the attitude of teachers who teach in government, aided and private schools. Comparison of scores using One-way ANOVA ( $F = 2.48$ ;  $p > 0.05$ ) clearly illustrates that type of management fails to exert any influence on the attitude of teachers.

5. On the basis of experience, teachers were classified into three categories. Teachers with 3 years or less experience fall under the first category. The second category constitutes of teachers with 4 to 7 years experience and those with 8 years and above experience are put in the third category. Comparison of the scores on the basis of the three groups using One-way ANOVA revealed that no significant difference exists in the attitude of teachers classified on the basis of experience ( $F = 1.24$ ;  $p > 0.05$ ). Teacher's attitude towards ICT remains the same, in spite of the difference in the years of teaching experience.

6. Irrespective of the difference in gender, locality, management of teaching experience, majority of the secondary school English language teachers display uniformity in their attitude pattern. Teacher's attitude is highly favorable to the use of ICT in teaching English. All the above mentioned factors fail to cause an effect in the attitude of teachers towards the use of ICT. A good number of secondary school English language teachers (57%) are of the opinion that their schools have ICT facility. Here, 37 per cent of teachers admitted that their schools lack ICT facility. Only 52 per cent of teachers share the view that the available facilities are used effectively. Forty-eight per cent of teachers acknowledge that their schools fail to use the available facilities effectively.

8. In the opinion of 64 per cent of teachers, the attitude of school authority is favorable towards ICT usage. They promoted the usage of ICT in teaching-learning process. But, 36 per cent of teachers expressed the view that the attitude of the school authority is unfavorable, as they do not promote the ICT usage.

9. Most of the secondary school English language teachers (90%) are of the view that students enjoy the use of ICT. A difference of opinion is expressed only by 10 per cent of teachers. They believe that students do not enjoy the use of ICT in teaching-learning process.

10. To a great extent, the success of ICT integration depends upon the available suitable measures like educational software and games. Only 40 per cent of teachers reported that their schools have a good collection of educational software and games. Majority of teachers (60%) are of the view that schools do not possess software and games enough to facilitate ICT integration.

97 Summary, Conclusions revealed that a very high percentage of teachers (90%) are willing to use

ICT in future if they are provided with necessary training and support and 10 per cent of teachers do not like to use ICT even if they are assisted by adequate training and support. Possession of a Personal Computer is disclosed only by 45 per cent of teachers and 60 per cent of teachers admitted to use computer to enrich their profession, even though they do not have a personal computer. Internet connectivity is enjoyed by 44 per cent of teachers. 13. ICT devices play a significant role in making ICT integration a success Teachers opined that almost all secondary schools have basic ICT devices. Telephone (98%), radio (97%), tape recorder (86%) and television (88%) are the most commonly available basic devices. A good number of schools have advanced ICT devices. A vast majority (92%) of teachers reported the availability of computers in schools and 68 per cent of teachers claimed that their schools have internet link. It is also noted that 55 per cent of teachers asserted the presence of IT labs followed by LCD (30%). Language lab (28%), Fax (13%) and CCTV (5%) are the devices that are available only in select schools. It is high time to equip all schools with advanced ICT devices for their presence will determine the success and future of ICT integration. Analysis of data helped to project the extent and significance of certain factors that influence ICT integration. Attitude of school authority (68%), MW 98 Summary, Conclusions and Suggestions personal interest of teachers (65%) and training (64%) are identified as the most significant factors that exert great influence on teachers' Id usage. In order to make ICT integration successful and effective, barriers to ICT integration must be removed. This investigation helped to identify the main barriers to ICT integration. On the basis of teacher's opinion, lack of support from school authority impedes ICT integration greatly (88%). Lack of adequate resources (72%), lack of training and technical support (70%), high cost of ICT devices (69%) and lack of ICT skills in teachers (62%) are the other important barriers. Teachers express the opinion that the lack of interest from the part of teacher (56%), lack of a uniform ICT policy (51%) and heavy workload of teachers (43%) can hinder ICT integration considerably. Only a small proportion of teachers consider the lack of ICT literacy in students (35%) and ethical, legal and safety issues (32%) as barriers to ICT integration.

**Kumar Raja, A. (2004).** Influence of creativity and awareness of information technology of higher secondary school teachers on their teaching effectiveness. The Centre for Research St. Xavier's College of Education, Palayamkottai

Teachers who are creative have already an edge over the rest in making their teaching effective. When that is combined with the awareness of the latest technology, the idea holds good for the future, of the students, education and the teachers themselves. Creative and updated teachers are bound to be more effective in teaching than the rest. Effective teaching involves preparing and planning for teaching, classroom management, and thorough knowledge of the subject matter, positive personality traits and good interpersonal relationship. All these make a teacher very successful in transmitting his knowledge, skills and values to the students. But those who are creative make use of the above mentioned five dimensions in a much more innovative and effective way than the others. This study intends to find out the influence of creativity and

awareness of information technology on the teaching effectiveness of the higher secondary school teachers.

According to the results of multiple correlation analysis, creativity and awareness of information technology are influencing the teaching effectiveness of the higher secondary school teachers. This may be due to the fact that the teachers who are creative and empowered with the latest technology are likely to gain more competence in teaching than others. Further it is observed that creativity and awareness of information technology do influence the teaching effectiveness of male higher secondary school teachers. This may be due to the fact that the male teachers who are creative and empowered with 216 the latest technology are likely to be more effective in teaching than their counterparts. Moreover, creativity and awareness of information technology of the female higher secondary school teachers are influencing their teaching effectiveness. This may be due to the fact that the ability to have divergent thinking and the knowledge of the latest technology of female teachers help them to teach their lessons very effectively. However, it is observed that creativity and awareness of information technology of married and unmarried as well as graduate and post graduate higher secondary school teachers have a significant influence on their teaching effectiveness. This may be due to the fact that irrespective of whether they are married or not, more qualified or not, the teachers have been influenced by the knowledge of the latest technology and this helps them to teach their lessons very effectively. Their ability to have divergent thinking and the knowledge of the latest technology together makes them very effective in their teaching. It is also observed that creativity and awareness of information technology of the higher secondary school teachers with less than ten years of teaching experience as well as those with ten or more years of teaching experience are influence their teaching effectiveness. This may be due to the fact even the experienced teachers may have been influenced by the on-going courses, workshops and training programmes in information technology.

### **Researches focused on ICT integration teaching in various Subjects.**

**Sengamalaselvi, J (2016)**, Studies on effectiveness of ICT with geogebra and winplot as learning tools, Ph.D. Thesis, Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya.

Information and Communication Technology (ICT) is an important instrument, which can transfer the present isolated, teacher-centered, book-centered learning environment into a rich student-centered environment. It is a new teaching-learning process, aims at transferring the old traditional paradigm of learning to the new paradigm of learning and of course teaching. In this sense, UNESCO is giving a high priority to the use of ICT for more equitable and pluralistic development in education, and research work aiming to expand the knowledge base about the issues pertaining in the implementation of ICT in education which mainly centered on interactive learning environment. A strong literature review is made which paved a way for our research and indicates an intrinsic gap to be filled in the studies on traditional and ICT based teaching methods. Based on the literature, the work highlights in the area of mathematics, particularly in

the field of two and three dimensional analytical geometries. The issues related to graphical representation of two and three dimensional diagrams are addressed with the help of Geogebra (i.e. open source software), which can be downloaded by students without any cost. Necessary attempts, including workshops were conducted for the success of addressing two and three dimensional analytical geometry and addressing problems with Geogebra software are discussed. Further the work extends, the implementation of ICT in the area of electrical circuit, to assess the requirement of its necessary parameters with the help of winplot (i.e. open source software), were also discussed. Statement of research teaching practices differs for primary, secondary and higher education. Teaching Mathematics for these three category students plays a critical role. How ICT tool can be used for teaching mathematics for those students effectively. Comparison of traditional teaching practice vs traditional practice along with ICT tools methodology and tools used For the present study the study groups were taken from Primary and Higher secondary level. The Research design was descriptive experimental in nature. The study population comprised of student from Primary and Higher secondary level. The population source list was generated from selected school level students. The sampling unit derived from population comprised both Male and female students (At primary level 1 to 5, Higher secondary level Plus one). The required samples for the experiment (Primary-15, Higher secondary school-28) were chosen among the target group by conducting preliminary Screening test with pre-determining cut off marks. The selected samples were underwent experiment for verifying the effectiveness of utilizing Geogebra and winplot, ICT as learning tools. The experimental design validated the effectiveness through pre and post test. Implementation of ICT as a whole in education may require a decade due to socio-economical factors and studies related to ICT alone may result in vein, so the work is focused to compare conventional teaching practice with and without incorporating ICT. Better results are obtained for studies made with the implementation of ICT along with the traditional approach rather than simply conventional alone. Measures are taken to quantify the results obtained during the comparative study using statistical based software ( i.e. Design Expert 7.0) is an another milestone of our study. Our study concludes that incorporating ICT with traditional approach is beneficiary to students in all means. The result shows that there is a significant difference in the learning impact among the students using conventional method and conventional method with ICT tools. The results of the research work created a major impact on the educational system especially in Mathematics. Findings of the study: Conventional method of teaching when supported with open source software helps a better understanding of Mathematical concepts. The introduction of two and three dimensional graphical representation and animation simplifies and clarifies the mathematical concepts like Analytical Geometry and Calculus. Instead of just imagining the figure as in the conventional method, the students are able to visualize through Geogebra software. There are various benefits in using Geogebra software in teaching Mathematics for Higher secondary students. The following are the advantages of using Geogebra software; Students are able to understand easily difficult concept in simplified Graphical and dimensional representation.



**Kaur, J. (2015).** Effectiveness of an environmental education programme utilizing ICT in influencing environmental sensitivity awareness ethics and attitudes among secondary school students. Unpublished Ph.D. Thesis, Kurukshetra University.

The focus of the study was to ascertain the relative effectiveness of an Environmental Education Programme Utilizing ICT in Influencing Environmental Sensitivity, Awareness, Ethics and Attitudes among Secondary School Students. The investigator decided to develop an Environmental Education Programme Utilizing ICT and study its effects in influencing Environmental Sensitivity, Awareness, Ethics and Attitudes among Secondary School Students. Environmental Education Programme Utilizing ICT motivates the students to present their views regarding environment concepts and they also show concern about the environmental problems. So, the Environmental Education should be imparted to the students through the use of ICT. Teachers should get opportunities to attend workshops and refresher courses etc. to equip them to prepare Environmental Education Programme Utilizing ICT and present the concepts to the students with the help of this programme. All the major Environmental Educational concepts should be included in the Secondary School curriculum. Innovative instructional strategies for Environmental Education curriculum transaction should be used. Teachers should sensitize the students and make them aware of all the Environmental issues and aspects. Rigorous training should be given to pre-service and in-service teachers to learn, to select and blend the different strategies used for preparing ICT based programmes for transaction of the content of Environmental Education. The educational institutions should organize refresher courses for the in-service school teachers to train them to prepare and use the ICT based strategies in transaction of content of Environmental Education in the classroom and become better prospective teachers. The head of the institutions should arrange Environmental Education programmes based on ICT and modern techniques. The principals should arrange seminars, discussions etc. for developing environmental sensitivity, awareness, ethics and positive attitude among teachers and students in the school. More books, journals etc. based on Environmental Education should be made available in the school library. Teachers should be encouraged to participate in seminars, workshops and refresher courses conducted on Environmental issues. Sufficient financial aid should be allotted to organize nature club and sufficient audio visual aids, internet facility should be made available in the schools to explore the Environment. The natural environment and natural resources should be protected and conserved. The government should enforce it through laws and insist the Education Department to instruct the school students to protect and conserve our natural environment. The secondary schools should organize nature club and all the students should be members of this club. The government should also take initiative to allot funds to the schools for organizing nature clubs and for developing innovative teaching strategies for Environmental Education. Teachers should be encouraged to use innovative practices in teaching Environmental Education utilizing ICT. They can be motivated and encouraged by the government by giving certificates and awards to those who are doing innovative practices in developing new strategies of teaching Environmental Education. Effective steps should be taken for revising the present secondary school curriculum with more environmental issues and aspects

included in it. So, in the curriculum subject matter of that type should be added 21 where teacher can use the ICT based programme, to keep pace with the changing society. Teachers should get orientation in teaching through Environmental Education Programme utilizing ICT and students should be oriented to the ICT based concepts, based on the newly as well as technically introduced curriculum on Environmental Education at all levels of the education.

**Dnyaneshwar, S. (2014).** The Impact of Information and Communication Technology on Teaching English Tenses at the Secondary School Level. Unpublished Ph.D. Thesis, Faculty of Humanities and Social Sciences, Symbiosis International University, Pune.

The dissertation is an attempt to study the impact of ICT on teaching of English tenses at the secondary school level. The study is carried out to bring out the relevance and practicality of integrating ICT as a teaching aid into the teaching of English tenses at the secondary school level in Pune. The main objective of the present study is to find out whether ICT can contribute to better teaching of tenses especially at Marathi Medium Secondary School Level. The findings of the present study show that there is a considerable change in the learning of tenses with the help of ICT. Students learnt tenses in a better way through ICT. Learning tenses through ICT motivated and created interest among learners. It boosted their enthusiasm to participate in various activities conducted in the class. They became active, attentive, curious and showed involvement in the teaching-learning process. ICT helped to have a lively classroom, where interaction was from both the ends.

**Bahadorfar, M. (2014).** The effect of computer assisted language learning on EFL learners attitudes towards learning English vocabulary. Unpublished Ph.D. Thesis, University of Mysore

This study presented an evidence for facilitating effect of CALL on EFL learners' vocabulary learning. In the current study, autonomous learning, giving immediate feedback, could be essential reasons for the effect of CALL on learners' vocabulary. The autonomous learning provides learners to have control on their own learning at their own pace.

In this approach, the teachers are responsible for directing the learners and solving software problems, but learners are responsible for their own learning. In traditional instruction, learners have oral explanations of teachers in class. CALL instruction provides learner native pronunciation audio visually which can help them to correct their pronunciation mistakes.

A quasi-experimental study of computer application and traditional method was implemented with 60 participants at Mysore University for about eight weeks. The participants were randomly divided in to two groups of 30, namely experimental and control. Experimental group received CALL instruction and traditional instruction was used in control group. The data was collected from the results of the pre-test and post-test and two attitude questionnaires. For all descriptive and inferential statistics SPSS 15 version were applied.

**Angel Rathnabai, S. (2014).** Effectiveness of ICT Infused Instructional Design IIID in methodology of teaching mathematics at secondary level. Unpublished Ph.D. Thesis. Education. University of Mysore.

Society faces a tremendous development in technology and communication spectrums that has its impact on school system. So the focus of the schools has changed to prepare students to face 21st century with a new skill sets. As ICT is believed to challenge students' thinking and engage them in investigations for them to demonstrate a higher order of reasoning, teachers are expected to use ICT by adopting a, transmission' view of teaching. Effective uses of ICT enable students to focus on reasoning rather than on answers, and enable them to develop significant strategies and connect ideas with the real world. Teachers can use ICT effectively in teaching only when they are trained on ICT-pedagogy integration. Therefore, teacher education plays a vital role in training pre-service teachers in ICT-pedagogy integration. There are several approaches for ICT integration in teacher education programmes recommended by national and international agencies, among which infused model is recommended for better ICT pedagogical integration. The present study is about finding the effectiveness of ICT Infused Instructional Design (IIID) in methodology of teaching mathematics at secondary level on confidence in using ICT, knowledge on ICT, attitude towards ICT, ICT skills and techno pedagogical competency in teaching mathematics. A curriculum was developed by infusing ICT components in all ten units of "Content and Methods in Teaching Mathematics" course of B.Ed programme offered by Tamil Nadu Teacher Education University (TNTEU) by describing the instructional strategies to be followed by teacher educator to transact the content and learning activities for student teachers to practice. The ICT infused course content, instructional strategies and learning activities altogether is termed as ICT Infused Instructional Design (IIID) in methodology of teaching mathematics at secondary level. The study is quasi experimental in nature with pretest-posttest three group design. 58 students belonging to mathematics stream of three B.Ed colleges affiliated to TNTEU were taken for this study where one group was exposed to IIID in methodology of teaching iv mathematics (infused model), second group to enhancement programmes on ICT (integrated model) and third group to bridge course on ICT (complementary model). Five tools namely ICT confidence scale, ICT knowledge scale, ICT attitude scale, observation schedule for ICT skills and observation schedule for techno-pedagogical competency in teaching mathematics were developed and validated to collect data for this study. Resources, software and hardware required for transacting the content were developed, downloaded or collected respectively and the interventions were implemented for one academic year. The study revealed that the ICT infused instructional design in methodology of teaching mathematics (IIID-MTM) was effective than other two treatments in developing knowledge on ICT, confidence in using ICT, attitude towards ICT, ICT skills and techno pedagogical competency in teaching mathematics (TPC-TM). The mean gain in knowledge on ICT, ICT confidence and attitude towards ICT was found to be higher in the group exposed to IIID-MTM than the other two groups. Adjusted means of the group exposed to IIID-MTM when pre test scores were taken as covariate was found to be higher than the other two groups with respect to knowledge on ICT, attitude towards ICT and

confidence in using ICT. This shows that IIID-MTM is effective than bridge course and enhancements programmes on ICT. The elective course “computers in education” has not influenced student teachers ICT knowledge, confidence, attitude, skill and TPC-TM. It was found that the knowledge on ICT and attitude towards ICT predicts ICT skills, but knowledge on ICT was found to be contributing higher towards ICT skills than the attitude towards ICT. Though attitude towards ICT and ICT skills were found to be predictors of TPC-TM, attitude towards ICT was found to be contributing more than the ICT skills. On the basis of these findings it is concluded that ICT infused instructional design in methodology of teaching mathematics is effective in developing confidence in using ICT, knowledge on ICT, attitude towards ICT, ICT skills and techno-pedagogical competency in teaching mathematics. The findings of the research have several implications for the present teacher education programme. Teacher education curriculum need to be redesigned to infuse ICT throughout the curriculum that can bring change in preparedness of pre-service teachers to use ICT in teaching, thus meeting the demands of the school system.

**Baby, J. (2013).** Developing a computer assisted instructional package for learning organic chemistry at higher secondary level. Ph.D Thesis, School of Pedagogical Sciences, Mahatma Gandhi University, Kottayam.

Science is a systematic knowledge of our environment. Science education has become mandatory at all level of education from primary to higher education as recommended by University Grant Commission. The Indian Education Commission (1964-66) recommended teaching Physical and Biological Sciences from the primary level. Chemistry is one of branch of Science and it develops scientific understanding, attitude, interest, scientific skills etc. National Policy on Education (1986) emphasized the need of achieving minimum levels of Learning at school level. This may help teachers in organizing meaningful teaching learning experiences and adopt innovative methods and approaches in teaching. The computer has witnessed a wide range of applications in virtually all human endeavors. It has also found its way into the classroom, and educators now look in its way as a panacea to prevalent pedagogical challenges. Researchers have indicated that appropriate use of the computer for science instruction facilitates teaching and learning. Computer assisted Instruction (CAI) is a supplementary instructional strategy in effective teaching, in the same line CAI is also used in Chemistry teaching. In this paper, researcher elaborates use, utility and importance of CAI in Organic Chemistry teaching. A preliminary survey was conducted to find out the present status of teaching Organic Chemistry at higher secondary level. A questionnaire, prepared by the investigator was used to collect factual information from twenty teachers who were handling Chemistry in the higher secondary level. The data revealed that there are some problems inherent in the teaching of Organic Chemistry. Hence the investigator decided to develop a Computer Assisted Instructional Package for learning Organic Chemistry at higher secondary level. The different phases involved in the preparation of the package are analyzing phase, Designing phase, Developing phase, Implementation phase and evaluation phase. The effectiveness of the prepared package on

achievement in Organic Chemistry was then found out. Experimental method was used for this purpose. Non equivalent pre test-post test design was used with a sample of 340 higher secondary school students. The effectiveness of the package was tested on some other related variables like Chemistry Attitude, Chemistry Interest and Metacognitive Awareness of higher secondary students. The statistical techniques used for the present study were t-test, ANOVA, ANCOVA etc. The findings of the study revealed that the prepared package is effective in enhancing Achievement in Organic Chemistry, Chemistry Attitude, Chemistry Interest, Metacognitive Awareness and Retention capacity of higher secondary school students. The study implies the application of integrated modern technologies in the teaching-learning process in our classroom.

**Kumar, R. (2013).** Exploring the efficacy of computer assisted learning in addressing alternative frameworks among learners in science. Unpublished Ph.D Thesis, Department of Education, University of Delhi

The study explores the teaching learning contexts in science classrooms with respect to two aspects. The first aspect is related to the teachers' natural dispositions towards formation and addressing of the Alternative Frameworks and the second aspect to the possible sites of formation of Alternative Frameworks among learners of science. An attempt to understand the science teachers' perceptions about Alternative Frameworks in relation to the use of Computer Assisted Learning has also been made. This understanding has been used further in two ways – firstly, for identifying the characteristics of a desirable computer-assisted learning program as per the perceptions of science teachers and secondly, for evaluating the features of some of the existing computer-assisted learning programs in science. Significant implications on Science Education have emerged on the basis of the findings of the study. Also, a need to develop an appropriate Computer Assisted Learning Program for addressing Alternative Frameworks among learners of science has emerged. The analysis of data gathered from the science teachers reveals that such a Computer Assisted Learning program may enable the science teacher to meet the challenges, which at present, are being faced to a large extent and the teachers are not able to address them. The findings of the study reveal that the issues of availability, awareness and the experience of using Computer Assisted Learning program/s among science teachers also need to be addressed. The findings contribute towards developing an understanding of the characteristics of a desirable computer-assisted learning program that can be used for addressing Alternative Frameworks among learners of science.

**Khasnis, B.Y. (2011).** Development of computer assisted instructional material for remedial measures in geometry. Unpublished Ph.D Thesis, Karnataka University.

The present study is an effort to make available quality software that could provide assistance to children in learning skills in mathematics. Schools have been teaching mathematics on compulsory basis through all the stages because of its multifarious and many sided values of human being. National Policy of Education (1986) remarkably suggests that —“Mathematics

should be visualized as the vehicle to train the child to think, reason, analyze and articulate logically.” Attainment or achievement in mathematics is based on mastery of fundamental skills. The new curriculum in Mathematics at secondary school level demands for rapid learning and clear understanding of new curriculum. In this curriculum more concepts, theories, theorems, principles, axioms, postulates, formulae have to be taught and students have to be trained in solving numerical problems. The researcher had observed the achievement of the students in Mathematics at secondary school level. The achievement of some students may be cent percent in mathematics and at the same time the rate of failure in Mathematics and in different examinations is considerably higher than the other subjects. Moreover students who is learning Mathematics as compulsory subject has not only to cope with mechanical problem solving but also the problem of drawing, arranging, construction, identifying figures, as demanded by the occasion keeping these requirement of the students learning geometry motivated researcher to undertaken such study. Although recent years have seen a significant growth in the development and use of computer aided instructional packages, much less materials are available for teaching mathematics than for other subjects. However, there are many mathematical programmes using a drill and practice format. These are common in today’s school. Unfortunately they are not congruent with our current understanding of how to foster the skills in children. There is a need of designing educational programmes as all curricula, with specific target goals and desired outcomes in mind. The goals must be considered before and not after the producing the development. The methodology being proposed in this study is simply a new application based on techniques that have long been a part of conventional instruction. Considering the complex nature of subject and lack of quality software, there is an acute need for developing computer software that could aid children in developing skills in geometry. The use of computers for this purpose has certain advantages like interactivity, motivation, self learning etc., to exploit the application of computers for guiding students in developing skills in geometry is hence timely. The results of the present study was in consonance with the results of many of the experimental studies demonstrating construct of instructional material of computer software and effectiveness of computer assisted instruction for better student achievement in Geometry.

**Kumud, K. (2011).** Effect of information and communication technology ICT on the students achievement in Mathematics at secondary level. Unpublished Ph.D. Thesis. Maharshi Dayanand University.

In the present scientific and technological age, since the conventional teaching methods are not sufficient to arouse interest among the students and do not meet up to the intellectual, psychological and emotional needs of the students in the new millennium, the methods of teaching mathematics need to be changed. The integration of technology into teaching and learning of mathematics has also not escaped the attention of educators. As a discipline, mathematics too is very much influenced by the rapid development of Information and Communication Technology (ICT) and mathematics educators have been looking at ways to integrate ICT into the curriculum over the last decade. The key benefit promotes greater

collaboration among students and encourages communication and sharing of knowledge. ICT gives rapid and accurate feedback to students and this contributes towards positive motivation. It also allows them to focus on strategies and interpretations, answers rather than spend time on tedious computational calculations. Recent developments in technology have changed the world outside as well as inside the classroom; making it quite eye-catching and interesting for the students to know and to learn. Developments in the application and dissemination of knowledge and information technology have had changing demands on education. The infusion of information and communication technology (ICT) into teaching and learning and for that matter into actual and virtual classroom has generated much interest in educational research in recent years. ICT have the potential of proving an alternative and more effective teaching and learning tool in education. Evidence emanating from research literature suggests that ICT has a powerful and significant impact on education both in terms of students' affective and cognitive outcomes in learning any subject of their choice. It has tended to make learning joyful and lasting in very many ways. So the investigator decided to develop syllabus based Power Point Programme to teach Mathematics to the students of IX class and study its effect on them.

The present thesis attempts to demonstrate the effectiveness of ICT for teaching of Mathematics. The study establishes the effectiveness of ICT by comparing the achievement scores of IX class of two groups (Experimental and Control group) by teaching the topic 'Surface Area and Volume' in Mathematics from their prescribed syllabus. The PPP was developed by the investigator includes text, pictures, graphics animation audio, video clips. This thesis develops an approach to understand the making of PPP and study its effectiveness. The findings of the present study are exerted to benefit the students, teachers and teacher educators. Pre-test, Post-test, control-quasi - experimental group design was employed with purposive sample in the form of intact sections of class IX of the same school. It involved two groups of students, experimental group and control group. The experimental group was taught using ICT and control group was taught the same content through traditional method. The design comprised of three stages. The first stage of the study involved testing of students' achievement adjusted on their intelligence and socio-economic status in both the groups. Cattell's Culture Fair Intelligence Test and Socio Economic Status Scale by N. Kumar et al. were the standardized test used at this stage. The second stage involved experimental treatment. The experimental treatment consisted of teaching the topic 'Surface Area and Volume' to IX class students using ICT to experimental group and through traditional to control group. In the third stage the students of both the groups were post tested on the achievement in Mathematics and confidence level in answering the questions. Achievement test, opinionative for teachers, development of PPP for instructional treatment were the self developed tools used for the present investigation. Descriptive statistics such as means, S.Ds and 't' value were worked out on the score of Achievement and TCLAQ. At the end of experimental treatment the group of students taught Mathematics using ICT method Showed a significantly higher gain score on the Achievement test and TCLAQ than the group of students taught through traditional method. The results of this analysis are statistically significant and have important practical applications for the field of education. ICT has the unique strength of

communicating the difficult concept in simpler ways and, thus offers several advantages to the field of education.

**Singh, Kamal. D. (2010).** Development of Computer Assisted Instruction in Accountancy and Evaluation of its Effectiveness at Senior Secondary School Level. Unpublished Doctoral Thesis. Delhi: Jamia Millia Islamia.

The concepts of CAI, TI & effectiveness of CAI were operationally defined for the study based on Quasi-experimental comparative design. Methods of Instruction-Experimental group taught through 'Computer Assisted Instructions plus Traditional Instructions' (TI with CAI) and Control group taught through 'Traditional Instructions only' (TI). Mean score of achievement of the students. Population: All students receiving education in commerce stream at senior secondary school level and studying Accountancy as one of the core subjects; Sample: A small group of 80 students studying in a Public School (affiliated to CBSE) at New Delhi (India), as students under a formal system of education receiving education in Commerce stream, divided in two sections (kept intact) of Class XI (Commerce) forty students in each section; studying Accountancy as one of the core subjects. The 'purposive sampling' method of data collection was adopted.

A CAI package was developed and validated for the experimental group. To evaluate the effectiveness of CAI from the students who experienced CAI, a questionnaire was prepared, validated, and standardized. Pre-test, for mean achievement score from both the groups, was conducted. Experimental group was taught through the developed Computer Assisted Instructions and the control group through the operationalized version of Traditional Instructions; the content remaining the same for both groups. Post-test, for mean achievement score from both the groups, was conducted. Responses on a specially prepared Questionnaire, for the evaluation of effectiveness of Computer Assisted Instructions, were requested from the group of students who had received instructions through computers. T-test was used to judge the statistical significance of the mean scores in intra-group comparison of pre-test and post-test achievement scores in accountancy.

On comparing the mean gains, a comparative increment of 15.97% was recorded by 'TI with CAI' group over 'TI' group. On analysis of the responses of the questionnaire developed for effectiveness of CAI; 89.5% of the students stated it be internally effective, 85.3% found it to be comparative effective, 55% of the respondents reflected that the developed CAI tried to cover the Definitive Fine points, and 81.5% found CAI to be Overall effective with an overall average of 77.82% responses favored the effectiveness of Computer Assisted Instruction. The analyses indicate that 'TI with CAI' is more effective than 'TI'; and Computer Assisted Instructions (CAI) work effectively as a method of instruction. Computer Assisted Instruction should be supplemental to the regular teaching process, where the teacher should act as a facilitator for interaction between a student and a computer. CAI should also be part of Teacher Education Curriculum.



## **Researches focused on use of ICT in Teacher Training.**

**Sure, S. (2010).** A study of factors influencing effectiveness of computer education course in B.Ed programme. Ph.D Thesis, University of Mysore.

According to the National Policy on ICT at School Education, government intends to introduce a programme of ICT literacy across all secondary schools in the States within the XI plan period. Hence teachers need to incorporate technology into the lessons. So ICT has been made a compulsory component of teacher education programme in India, particularly at secondary level (NCTE, 2006). The University of Mysore introduced Information Communication and Technology as a component of secondary teacher education by introducing a compulsory paper „Computer Education“ in the academic year 2005-06. The present study explored the factors influencing the effectiveness of computer education course. The study predicts the computer competency and computer self-efficacy of the student teachers. Present study employed survey method. Multistage sampling technique was employed in this study. 16 B.Ed. colleges affiliated to the University of Mysore were randomly selected. 578 student teachers from these B.Ed. colleges were selected by stratified random method. Teacher educators teaching computer education course in selected 16 B.Ed. colleges constituted teacher educator sample of the study. Seven tools developed and validated for the study measured student teachers“ computer knowledge, computer skills, attitude towards computer use, and computer self-efficacy, teacher educators“ computer knowledge, computer skills, and attitude towards computer use, and institutional e-maturity. Descriptive analysis was used to study institutional e-maturity and teacher educators“ computer competency, paired t-test was conducted to find the effectiveness of the course, ANCOVA technique was employed to identify the factors influencing outcome of the course and multiple regression analysis was carried out to predict the computer competency and computer self- efficacy of the student teachers. The findings revealed that B.Ed. colleges affiliated to University of Mysore have moderate e-maturity. It was also found that though the institutions have better e-learning resources; its integration across curriculum was poor. Teacher educators have average computer knowledge, are perceived to have high levels of computer skills, and have highly positive attitude towards computer use. The computer education course was found to be effective in bringing significant improvement in computer knowledge, computer skills and computer self-efficacy of student teachers. Subject background was found to be a factor influencing on computer knowledge, computer skill and computer self-efficacy of student teachers. Gender was found to be a factor influencing on student teachers“ computer knowledge and attitude towards computer use. Student teachers“ computer knowledge and computer skills were influenced by institutional e-maturity. Computer knowledge and attitude towards computer use of student teachers were influenced by teacher educators“ computer competency. Student teachers“ pre-computer competency was found to be the major predictor of student teachers“ computer competency; even in the case of computer self-efficacy, student teachers“ pre-computer self-efficacy was found to be a major predictor. The findings have implications for utility of available resources in teacher education institutions, training of teacher educators for

enrichment of computer knowledge and integration of computer in teaching and learning, and process of implementation of computer education course in B.Ed. programme.

**Researches focused on difficulties in implementation of ICT and relevant recommendations.**

**Shravan K. (2014)**, Study of difficulties in adopting ICT for teaching and measures thereby with specific reference to select higher education institutions in Pune, Unpublished Ph.D. Thesis, Bharati Vidyapeeth Deemed University.

We would like to recommend ICT Adoption Model to the higher education academia in India, which may be at any stage of technology adoption. We have tried to make it as much universal as possible so that without having to consider any type, stream or size of academia, model can be applied. The research has identified major difficulties faced by educators in adopting ICT in the form of – Awareness, Training, Existing capacity assessment, Planning etc. The idea behind narrowing down to limited number of major hurdles was to recommend implementation framework or ICT Adoption Model. Another important factor we found out was awareness of students about various technologies. Today's student is never-before tech savvy. He has access to the knowledge repertoire that is available on the internet. Hence it brings all that more responsibility on teacher's shoulders to equip better while teaching. ICT can just be a facilitator and a friend of teacher. Student awareness acts as an important influencer for educators while adopting ICT. The study also reconfirms certain limitations of existing technology adoption frameworks as well as comes up with altogether a new ICT adoption model more suited for Indian higher education segment. With its spread and infrastructure availability, Indian higher education sector has a lot of challenges in every change management. Its education system too is now much Indianized when it comes to student backgrounds.

**Maryam, M. (2013)**. Feasibility and application of ICT in secondary schools. Unpublished Ph.D Thesis, Center for In-service Teacher Education, Department of Education, Osmania University

Information communication technologies (ICTs) are information handling tools that are used to produce store, and process, distribute and exchange information. The Internet is a valuable source of information used by students in projects and assignments. With over 50 million websites on the net, the chances are that information on any subjects however obscure can be found using appropriate tools. It also serves as a useful tool for lectures in helping to prepare lesson plans using a number of sites dedicated to providing educational material. The high schools may also be sensitized on the need to come up with ICT as a policy that would integrate its use in all educational performance. Finally through this study an assessment is made to know the feasibility of ICT in secondary 147 schools of Hyderabad and Ranga Reddy districts. Also this study would assist the high schools to make informed ICT investment decisions in the future. Present study found that all the principals appear to have average opinion about ICT programmes. However principals of private unaided schools expressed better opinion than

principals of private aided schools followed by government schools. Also principals who had computer availability at home expressed better opinion than who did not have computer at home. Moreover principals who had Internet connection at home had better opinion than who did not have Internet connection at home. On the part of teachers, it was found that they had good opinion about ICT programmes. Also teachers of urban area seem to have better than rural teachers. Further teachers with 16 years teaching experience were more interested in the use of ICT infrastructures and had better opinion than teachers had up to 11 years teaching experience followed by 164 teachers with 11 to 15 years teaching experience. Moreover teachers who had computer at home expressed better opinion than teachers who did not have computer at home. On the part of students, it was found that, boys expressed better opinion than girls. Also it is obvious those 12 years of students have better opinion than 13 years followed by 14 years and 15 & above. Further more students of private unaided schools expressed better opinion than students of private aided schools followed by government schools. Also opinion of students who had and used computer at home was better than who did not and not used computer at home. About infrastructure facilities in the schools, it was found that condition of ICT and their usage were good in private unaided and private aided schools and poor in government schools. On the whole it was observed that ICT room in terms of location and space for accommodating students for use of computers, ventilation and air condition system, climate-controlled and conducive atmosphere for learning along with other infrastructure facilities, was better in urban than rural also private unaided schools observed better than private aided followed by government schools. Furthermore it was observed that utilization of ICT programmes in terms of function of computer set, power supply and backup facilities, time slot and duration of the programmes, receiving schedule of the programmes in advance, was found to be better in urban schools than rural schools and also was found private unaided schools better than private aided schools followed by government schools.

**Narasimham, Y. (2013).** Status of ICT utilization in secondary schools: practical challenges and future recommendations a case of north coastal districts in Andhra Pradesh. Ph.D Thesis, Andhra University.

The present study is considered to investigate only secondary school teachers towards using ICT of working in government and private schools, rural and urban schools. The study is also limited to the secondary school teachers of North coastal districts (Srikakulam, Vizianagaram and Visakhapatnam) in Andhra Pradesh. It was noticed from the results that none of the above dimensions are significantly differed with management within Srikakulam district. Private school teachers showed more positive attitude and effective use when compared to government school teachers. This may be due to the fact that private managements invest more on ICT related equipment and maintain properly. The data obtained is that there is no significant influence between government and private teacher on above dimensions within Vizianagaram district. It seems that they could not have good access, less existence of computer skills, positive feeling towards ICT like; ICT improves teachers and students research skills and helps in information

reinforcement. It was observed from the results that there is no significant variation between management and ICT dimensions of policy & ICT and future education aspects. It may be due to the reason that even government school teachers are also very much interested to use computer facility in competition with the corporate school. It was noticed that management is not associated with above dimension. It might be the cause that number of students using a computer is very high, Lack of maintenance, lack of support from school, teachers and head teachers less knowledge on Andhra Pradesh government 's ICT policy and all government policies lack of explanation and teachers have to apply them without and not interested on future education system.

### **Research Abstract related to ICT usage in School Education**

**Ramesh, B. P., & Dibaba, W. (2017).** The Role of Effective Integration of ICT in Education, especially in Primary and Secondary Education of Remote Settings. *International Journal of Advanced Research in Computer Science*, 8(9).

It is obvious that ICT (Information and communication Technology) is affecting all sectors of human activities such as business, entertainment, education, health, manufacturing industries, etc. ICT's are playing paramount role in the various sectors in different ways such as creating more opportunities for an efficient and effective way of handling their businesses, facilitating knowledge acquisition, sharing and utilization that enhances quality of life, providing lifelong learning. Since education is one of the main keys to economic development and improvements in human welfare, the effective integrations of ICT's in the education sector to promote the education quality and accessibility is unquestionably becoming indispensable. This paper attempts to address the role of effective integration of ICT in education, particularly in primary and secondary schools, pointing out prevailing challenges and opportunities. Finally, it attempts to point out the how various stakeholders need to contribute for the effective integration of ICT in education especial in primary and secondary schools.

**Jain, M. M., & Tyagi, R. (2017).** Education standard can be improved by integrating ICT in education. *International Education and Research Journal*, 3(10).

Information and Communication Technology (ICT) can be utilized for the education sector. Education includes online, distance and part time education. There are unlimited applications of ICT in the real world. This paper is emphasized on the education field. Traditional Non-formal education system process includes activities like admission, Individual Contact Programmes, Exam for any course in a University or Institution. In this process ICT can play a great role in all the activities by providing a lot of benefits to students, teachers, parents and Universities itself. ICT can be used for providing education to the people who are not able to come to school due to various constraints. ICT can play great role in formal and non formal forms of education. The paper examines certain important issues related with the effective implementation of ICTs in all levels of education and provides suggestions to address certain challenges that would help in the implementation of ICTs in education and simultaneously enhancing Quality of education.

**Kumar, P., Mehera. C., (2016).** Impacts of Education on Sustainable Development: A Micro Study in Burdwan District of West Bengal, India. *American Journal of Educational Research*. 4(7):551-555. doi: 10.12691/education-4-7-7.

The present research paper attempts to examine the impacts of education on sustainable development in the district of Burdwan, West Bengal. The study covers two hundred households both in urban and rural areas consisting of 'Below Poverty Line' (BPL) and 'Above Poverty Line' (APL) of Burdwan district in West Bengal. As a statistical method, Chi-square test was used to examine the association between education and sustainable development of the households. The analysis also includes historical evolution and principles of education conducive to sustainable development. A conceptual framework has also been developed to visualize the role of education for achieving sustainable development through a system model. A binary logit regression model has been used to determine the extent of relationship between education and sustainable development by a set of selected indicators. Again, students't-test has been applied to examine the hypotheses whether any variation about the impact of sustainable development in terms of education among the households (i.e., rural and urban or APL and BPL families) exists or not. Finally, it has been concluded that education have had a significant positive impact on the sustainable development of households of Burdwan district in West Bengal.

**Damodaran, L., & Sandhu, J. (2016).** The role of a social context for ICT learning and support in reducing digital inequalities for older ICT users. *International Journal of Learning Technology*, 11(2), 156-175.

This paper examines the key role of formal and informal social support in reducing digital inequalities by enabling the digital participation of older people. It is based primarily on research conducted on the Sustaining IT use by older people to promote autonomy and independence (Sus-IT) project in the UK over a four-year period working with over 1,000 older people using mixed research methods within a participative framework. It is further informed by other studies. The rich, multi-faceted evidence reveals on the one hand the extensive learning and support needs and requirements of older users of information and communication technologies (ICTs) and, on the other, the dearth of reliable and ongoing support provision. ICT learning and support in the UK relies primarily on the goodwill of friends and family and on the availability of staff and volunteers in community venues, such as public libraries. Arrangements are often ad hoc and variable in quality and reliability. In a facilitated workshop, the learning and ICT support needs of older people and their preferred forms of provision were documented and deliberated. This generated a clear set of user requirements. To meet these requirements a proposition for community-based ICT support provision has been developed and refined. The paper concludes with consideration of this proposition which offers a powerful way to reduce the widespread digital inequalities among older people.

**Shradha H. Budhedeo (2016).** Issues And Challenges in Bringing ICT Enabled Education To Rural India. *International journals of Scientific Research and Education*, 4(2), 4759-4766.

Three-quarters of India's people reside in the rural areas and 30 percent are below the age of 15 years in their peak formative years of schooling. Nearly a third of rural India is still illiterate. The silver lining is that the enrollment and attendance ratios in rural schools have registered improvement over the past six years. In this situation, ICT enabled education in rural areas can be an innovative option to fill this literacy gap and to upgrade the teaching-learning process in the rural schools for tapping the huge reserves of human resources. In the process of bringing ICTs enabled education to the rural masses, there are many issues and challenges facing the rural education centers. The study explores these challenges and suggests suitable strategies for enabling smooth implementation of ICTs in rural education sphere for ensuring maximum impact and fuller utilization of resources.

**Iftekhar, S. N., & Jihye, H. (2016).** ICT based education for literacy in India: Vision beyond 2015. *International Journal of Information and Education Technology*, 6(5), 388.

Proportion of adult illiterates has improved in many countries over the last decade. Yet, the number of adult illiterates in India has remained the highest at 287 million since 1990 to 2010 because of the population growth. India constitutes of more than one-thirds of the world's adult illiterates which needs serious attention from the government. Defining literacy has been a debate in India, as in many developing nations. Literacy should be recognised as a continuum and as the laying stone of lifelong learning. Adaptation of skills and Information Communication Technologies (ICTs) with functional literacy skills as base for lifelong learning has to be a core element of the basic education agenda in India post 2015. The goal, targets and indicators for literacy have to be defined in a way that makes sense in relation to an overarching human capability agenda. Furthermore, multiple literacy skill levels need to be recognized. In India there is need to expand formal and non-formal adult education with the concept of life-long learning using ICT. It is suggested in the paper, how India can develop a strong and effective ICT based education system to impart literacy.

**Chinara, S., Sahoo, R., & Dwivedi, A. (2016).** Blended evaluation: A paradigm change in higher education by the use of ICT. Conference Paper in International Conference on Innovative Research in Computer Science, E-learning, and Information & Communication Technology (CSIT- 2016) organized by Krishi Sanskriti, Jawaharlal Nehru University, New Delhi, 7th May 2016

Teaching and learning are the continuous processes where one can gain, share and evaluate the knowledge. Since ancient time, conventional class room teaching and conducting examination are predominant in the teaching learning process. However, the development of ICT has brought a revolution by outreaching millions of students at a time to share the knowledge in real time. Blending of the conventional method with ICT has made the education system time-flexible, economic and efficient. The examination writing has been replaced by online quizzes, mobile apps, and discussion forums for face-to-face interaction. Massive Open Online Courses (MOOCs) have made the teaching learning process still simpler and interesting. This paper

discusses the blended method of teaching learning, evaluation and discussion. The detail design of a mobile quiz application for on-the-fly evaluation has been discussed thoroughly.

**Arya, A. (2016).** Understanding Components of Educational Transformation in Respect to Curriculum, Assessment, Skills, ICT, and Faculty Development (In Reference to Some Inputs for Draft NEP 2016').

The advent of New Education policy 2016 has been announced at the right time as this is so much needed with absolute change in knowledge-awareness among learner's community and system's inefficiency to bout them; also can't afford not to mention the kind of impact the global air of technological advancement and innovations have made. This paper is an effort to bring some unspoken amendments, the mechanism, their implementation and positive impact on the concerned community that the committee has been successful in being ignorant of. The paper tries to create space to explore more avenues and scope to the existing framework for its readers.

**Bhattacharjee, B., & Deb, K. (2016).** Role of ICT in 21 st Century's Teacher Education. *International Journal of Education and Information Studies*, 6(1), 1-6.

ICT is a scientific, technological and engineering discipline and management technique used in handling information, its application and association with social, economic and cultural matters (UNESCO, 2002). ICT stands for Information and Communication Technologies. ICT is a part of our lives for the last few decades affecting our society as well as individual life. ICT which is now broadly used in educational world. Teacher, Student, administrator and every people related to education are popularly used ICT. Teacher use ICT for making teaching learning process easy and interesting. A competent teacher has several skills and techniques for providing successful teaching. So development and increase of skills and competencies of teacher required knowledge of ICT and Science & Technology. In modern science and technological societies education demands more knowledge of teacher regarding ICT and skills to use ICT in teaching –learning process. The knowledge of ICT also required for pre-service teacher during their training programme, because this integrated technological knowledge helps a prospective teacher to know the world of technology in a better way by which it can be applied in future for the betterment of the students. Now – a-days ICT's are transforming schools and classrooms a new look by bringing in new curriculum based on real world problems, projects, providing tools for enhancing learning, providing teachers and students more facilities and opportunities for feedback. ICT also helps teachers, students and parents to come together. Continuous and Comprehensive Evaluation (CCE) helps students as well as teachers to use more technology for making teaching learning more attractive for the betterment of our future generation. Teachers must know the use of ICT in their subject areas to help the learners for learning more effectively. So, the knowledge of ICT is very much essential for the both prospective teachers as well as in-service teachers also. This will help teachers to know integrated technology with classroom teaching. This paper discussed about the role of ICT in 21st Century's teacher education.

**Misra, R., Misra, R., Srivastava, S., & Srivastava, S. (2016).** M-education in India: an effort to improve educational outcomes with a special emphasis on Ananya Bihar. *On the Horizon*, 24(2), 153-165.

The purpose of this paper is to undermine the role of cellular technology, government and the funding agency to deliver reliable and cost-effective health services for the people living in the bottom of pyramid and remote areas of the country where quality healthcare facilities are not available. The people living in rural Bihar (India) have a limited education and are reluctant to visit the female healthcare centers. The Ananya Bihar project has employed volunteers from the same community and aid from the foundation and government to improve the maternity and neonatal healthcare initially in eight districts of the state. The study reviewed various m-health projects and m-education projects with a detailing of the Ananya Bihar Project initiated by Melinda Gates foundation and Government of Bihar, India. The study uncovers technical, operational aspects and methodology followed by Ananya. It has detailed the best practices followed by the project. The study also features the capability of mobile as a tool to reach the masses in most cost effective way.

The use of mobile application with the association from the social worker has been tremendously successful in maternity and child healthcare in the state of Bihar, India. The application includes educating the user's about the healthcare, training for midwives, alerts related to vaccination and thereby reducing the mortality rate and improving the maternal healthcare for the people from the bottom of pyramid. The project has created awareness among the rural families and has improved the maternity healthcare in the eight districts of Bihar, India. They were also planning to expand the project in other states of India. The study is exploratory in nature and has not involved primary data collection and statistical analysis. The study has compiled the data and information available. The present study may be used as a reference to the organization working on mobile healthcare projects to understand the best practices of m-health project. The study also explains the role of various stakeholders (as Ananya-Bihar was a collaborative effort of Social trust, Technical experts, Network service provider, Community, State Government and the People) in the success of the project. The study explains the role of technology for the benefit of people. In the present case mobile healthcare initiated by the foundation has been very effective in dealing with maternity healthcare in rural Bihar, where people cannot afford expensive healthcare facility. The only silver lining is increasing tele-density at the most affordable rate in the globe, with funding from NGOs and full support from government. Such types of m-healthcare projects will support the government in delivering quality healthcare to the people who are living below poverty line and deprived of basic healthcare facilities. The study details the methodology and technical details of Ananya Mobile health care platform.

**Ahuja, A., Mittal, M. (2016).** Integration of Technology in Mathematics Education Paripex. *Indian Journal of Research*, 5(7), 71-80.



The present paper focuses on perception of teachers on the use of technology in Mathematics teaching and learning. Mathematics education is one of the domains where one can see prominent and growing effect of technology. It is believed and studied widely that use of technology can have positive effect on Mathematics teaching and learning, yet there seem to be some apprehension on the part of the teachers in the use of technology. This paper has attempted to study perception of teachers in detail on the use of technology in their Mathematics teaching and learning. The perception is studied with respect to the factors - experience of teachers and level of education. The relation between the perception and each factor is studied statistically and inferences are drawn. The sample of given study consisted of the teachers teaching in schools with convenient access to technology.

**Abdullah, A. M., & Gulzar, Z. (2016).** The Role of ICT for Improving Engineering Education in India: Challenges and Opportunities. *International Journal of Educational and Instructional studies in the world*, 4(3).

In today's educational world, Information and Communication Technology has become a vital element for educational reforms. There are several and desirable benefits of Information and Communication Technology (ICT) in Science and Engineering education. Despite advantages of ICT's and its attractive features their role in engineering education is lagging behind with respect to other disciplines of education. A structured online survey methodology was used in this paper which outlines the very important role of ICT, Its scope and merits in educational development in Engineering. Besides that a close look at the challenges related to technology adoption and Utilization is also discussed. Enormous opportunities that ICT can Offer, actions needed to overcome the challenges and the strategies for integrating ICT Engineering Education for effective teaching and learning at all levels of the tertiary educational system in the country is also highlighted.

**Richa A.J. (2016)** Problems of Teacher Education in India, *International Journal of Multidisciplinary Research and Modern Education*. *International Journal of Multidisciplinary Research and Modern education (IJMRME)*. ([www.rdmodernresearch.com](http://www.rdmodernresearch.com)) 2(3), 88-114

Teacher education is a continuous process and its pre-service and in-service components are complimentary to each other. Education is instrumental in the preparation of teachers who can in their practice ensure transformative learning, where teacher and learner, learner and learner are co-constructors of knowledge. The aim of the present paper is to improve the teacher education quality in India by focusing on the problems & related concerns. The present structure of teacher education is supported by a network of national, provincial and district level resource institutions working together to enhance the quality and effectiveness of teacher preparation programs at the pre-service level and also through in- service programs for serving teachers throughout the country. Importantly, the teacher education and training institutions must take up the charge of educating policy makers and the general public about what it actually takes to teach effectively both in terms of knowledge and skills that are needed and in terms of the school contexts that must be created to allow teachers to develop and use what they know on behalf of their students.

Now teacher has to perform various roles like encouraging, supporting and facilitating in teaching-learning situations which enables learners to discover their talents, to realize their physical and intellectual potentialities to the fullest, to develop character and desirable social and human values to function as responsible citizens. Teacher and his education are very significant aspects of any nation. The education gives a new shape to the individual and the nation as well. It is a well known saying that teacher is the nation builder. The quality of teacher education programme needs to be up graded. Teacher education has not come up to the requisite standards. Teachers are not able to think critically and solve the issue related to teaching methods, content, organization etc. teacher education programme needs a comprehensive reform and restructuring curriculum of teacher-education programme needs to be revised according to changing needs of society.

**Goel, D. R., & Goel, C. (2016).** Teacher education scenario in India: Current problems & concerns. *MIER Journal of Educational Studies, Trends and Practices*, 2(2), 31-49

The intent of the present paper is to enhance the teacher education quality in India by focusing on the emerging issues & related concerns. Various issues of teacher education namely, institutional inertia, brand inequity, quality crisis, overgrowing establishment, rare humane and professional teachers, poor integration of skills, alienated and incompatible modes of teacher education, little contribution to higher education, domain pedagogy mismatches, identity crisis, rare innovations, stake holders' non-alignment, inadequate technology infusion, little choice base, poor research scenario, vision and vision mismatches, non-scientific manpower planning, illusive laboratories, over activism of distance/open universities, invalid recognition and accreditation and no teacher education policy have been dwelt on in this paper. The paper concludes that teacher education system in India calls for revolutionary changes.

**Jacob, S., & Radhai, S. (2016).** Trends in ICT E-learning: Challenges and Expectations. *International Journal of Innovative Research and Development*, 5(2), 1145-1156.

Online education can be a highly effective and alternative method of education, which requires constant learning and is constantly evolving. In India, the rapid emergence of ICT has given far reaching impetus to the e-learning market. Subsequently, the growing presence of internet and increasing broadband connectivity has given a further thrust to interactive online learning. The prospect of making education available to anyone, anytime, anywhere is becoming increasingly appealing to students, the corporate world and the populace at large. It is necessary to consider both the advantages and disadvantages of online learning so you can be better prepared to face the challenges of working in this new environment and embrace the new opportunities that it has to offer. e-learning can provide a model for students on how to become self directed independent learners, which may assist them to become 'life-long learners' The role of the educator is predominant in the successful delivery of networked learning. There has to be a shift in focus from teacher-centred to learner-centred education, encouraging educators to provide courses which enable students to manage their own learning. Hence forth, this digital learning

atmosphere has potential to change the dynamics of the classroom. Paper is based on a survey conducted for the students and faculty to study and determine whether our higher education system and stake holders are ready for initiating digital e-learning. The paper also discusses whether the need of the hour is traditional learning method, e- learning method or a blended approach to both.

**Kumari, M., Goswami, V., & Gupta, A. (2015).** Learning Environments of Technology - supported Teacher Education Classrooms In Relation To Gender, Previous Qualifications and Teaching Subjects, *MIER. Journal of Educational Studies, Trends & Practices*, 5(1),71-86

The students of 21st century have very high learning expectations. Concept of teaching and learning has changed tremendously due to globalization and explosion of knowledge. New tools of Information and Communication Technologies (ICTs) may contribute considerably towards all phases of educational process including the area of teacher education. The need for teacher training is widely acknowledged in the light of this development. The aim of this study was to assess students' perceptions of the learning environments of technology supported teacher education classrooms in relation to three variables, i.e., previous qualification, gender and teaching subjects. A sample of 317 students from six classes was taken. The tool used for the study was the modified form of Technology-Rich Outcomes-Focused Learning Environment Inventory (TROFLEI). In these classrooms, different information and communication technology tools like laptops, computers, and multimedia projectors, interactive boards etc. are regularly used to communicate, disseminate, store, and manage curriculum information for the benefit of the students. Results of the study strongly support the reliability and validity of the questionnaire in these classroom settings. The results show that the students perceive their technology-supported learning environment in a positive manner. Results on investigation of previous qualification, gender differences and teaching subjects suggest that there exist some differences in technology-supported learning environments as measured by the TROFLEI.

**Gupte, M. (2015).** Does Information And Communication Technology Have An Important Role To Play In Indian Higher Education?. *International Monthly Refereed Journal Of Research In Management & Technology*, 4(1), 41-46.

The rapid development of Information and Communication Technology (ICT) has changed many aspects of human life. ICTs stand for Information and Communication technologies and are defined as a diverse set of tools and resources which are used for the purpose of communication as well as for the purpose of creation, dissemination, storage and management of information. ICT is playing an important role in today's world and education is no exception Use of ICT for promotion of education and development has always formed an integral part of the Indian policy and plan documents on education. The Indian Government has taken a number of measures at both the primary and higher education levels. The draft education policy of 1986, which was further, modified in 1992 laid emphasis on the role of ICT in promoting economic development. Several schemes have accordingly been adopted. ICT can play an important part from the view point of three agencies: teachers, students and government. If implemented correctly ICT can

help in the acquisition of 21st century skills. ICT in India has a number of challenges, in the form of infrastructural challenges, teacher related challenges, capacity building challenges, technology support challenges and language content challenges. India has a number of problems such as poverty. Illiteracy, language and health issues. ICT is definitely an engine of growth. It has to be propelled properly and the impending problems solved. Otherwise the ICT Revolution will be more a dream rather than a reality.

**Roy, S. D. (2015)** Application of ICTs in Teaching-Learning Process, *International Research Journal of Interdisciplinary & Multidisciplinary studies*, 1(7), 72-84.

ICTs are making dynamic changes in society. They are influencing every aspects of human life.

Application of ICT tools in Teaching-Learning Process has changed the total scenario of teaching learning process. Teaching-Learning Process is not now limited within the boundaries of classrooms. ICTS are making major differences in the teaching approaches and ways students are learning. This article discusses the meaning & definition of ICT, various components of ICT, ICT in education, benefits of ICT in Education, benefits of ICT in teaching-learning process. The main thrust of this article is how ICT tools are helpful in classroom transaction. Use of various Web 2.0 technologies for making teaching-learning process more interactive and interesting are also discussed in this article. Transition, Transformation and Revolution is the scenario of today's educational system. Application of ICT in education and teaching learning process has changed the traditional system of learning to modern ICT based learning. Teaching-learning process is not now limited within the boundaries of classroom. The modern technologies including new web 2.0 has changed the total scenario of teaching learning process. ICTs are making major's difference in the teaching approaches and the ways students are learning. ICT-enhanced learning environment facilitates active collaborative, creative, integrative and evaluative learning as an advantage over the traditional method.

**Sharma, H. K. (2015).** Role of ICT in Improving the Excellence of Education. *International Journal on Computer Science and Engineering*, 7(8), 78.

Information and Communication Technology (ICT) is increasingly becoming indispensable part of the education system. ICT has changed the style of functioning of the educational system and its governance. This paper considers the rapid spread of ICT applications which has brought drastic technological, social and economic transformations. These changes have caused educational institutions, administrators, teachers to rethink their roles, teaching and vision for the future. The sustainability of a nation in the era of knowledge and its economy depends on the effective educational system. It is considered as the comparative analysis of the inputs and outputs. In educational system, the inputs are teachers, students, classroom materials, equipments of teaching, methods of teaching and the outputs are quantity as well as quality of student learning. The proper integration of ICT with teaching/ learning environment increases the chance of gaining education along with increased productivity. ICT provides various opportunities to learners and make teachers aware of their new roles & responsibilities in educational set up. The

growing use of ICT will change many of the strategies employed by both teachers and students in the learning process. The role of ICT in the educational administration is recurring and unavoidable. The paper discusses various functions discharged by ICT in the field of Education and its most new usages. In general, ICT is going to play a vital role in bringing about qualitative change in every aspects of our life.

**K. Rajeswari, A. Selva Lakshmi (2015).**ICT- The Magical Wand for Transforming Teaching Learning Process, *Education India Journal: A Quarterly Refereed Journal of Dialogues on Education*, 4(2), 23-39.

The key to quality teaching and research essentially depends on the access to latest information, which should be available to a teacher. The UGC initiated scheme called “ICT for teaching and learning process” for achieving quality and excellence in higher education. The increasing use of information and communication technologies (ICTs) has brought changes to teaching and learning at all levels of higher education systems (HES) leading to quality enhancements. Traditional forms of teaching and learning are increasingly being converted to online and virtual environments. There are endless possibilities with the integration of ICT in the education system. The use of ICT in education not only improves classroom teaching learning process, but also provides the facility of e-learning. ICT has enhanced distance learning. The teaching community is able to reach remote areas and learners are able to access qualitative learning environment from anywhere and at anytime. It is important that teachers or trainers should be made to adopt technology in their teaching styles to provide pedagogical and educational gains to the learners. The digital revolution driven by information communication technologies has transformed academic libraries. It has an impact on every sphere of academic library activity, e.g., the form of the library, collection development strategies, library buildings and consortia.

**Pandey C. (2015)**, ICT and Quality Education in Indian Schools, *International Journal of Social Science and Humanities Research*, 3 (4), 603-605.

Each and every day there is something new that the Department of Education introduces with the collaboration of ICT. I think there must be a continuous training of teachers, school staff and administrators because sometimes there are new areas of teaching learning process where ICT gets involved and it becomes difficult to achieve goals for teachers to keep abreast with the changes if they are not properly trained. Some say it takes a lot of their time, some feel that the government must employ someone who will be responsible to deal with ICT only. But by making direct changes in the way teaching and learning are organized, we can make more effective ICT in the organization of the education sector. The policy implications of my analysis point toward much more emphasis on bringing teachers and educational administrators into the information age with computer training and with more teachers oriented easily accessible data bases that help teachers in their teaching.

**Radhika.V (2015)**, Analyzing the Influence of ICT in Education, ‘ICT & Innovations in Education’. *International Electronic Journal*, 3 (1), 1-6.

Teaching and learning process is known as education. Simply knowing some facts doesn't mean education but it should be used for solving the problems in life. Technological gadgets help learners to learn more of their own. Among all gadgets ICT now is considered as one of the most important inventions in the field of education. This paper evaluates the importance of ICT in education and the position of ICT in curriculum.

**Rathod G. & Jadhav, V (2015)**, Factors Affecting Secondary Teachers' Decision to Integrate Information and Communication Technologies (ICT) In Convent School, *International Research Journal of Interdisciplinary & Multidisciplinary Studies*, 1(5), 26-41.

The new generation learners are so fluent in using the technology that they want new things to learn in the day to day life. They come to school to get the new things which they required in the manner. The students are so intense to use this technology that they can tell about their iPods' or the social networking sites or about their smart phones. Life without technology is not possible now a days, technology has become the part and parcel of the life. This ICT helps to connect to the families with the job professional as well as the businesses. Buabeng-Andoh, (2012); Ertmer et al., (1999); Melita, (2005); Mikre,(2012). Globalization, industrialization, privatization is all the concept and blessing of the technology in one or the other ways. The use of ICT in the teaching-learning process has the immense impact on the learning process. The factors which hindrance or support the use /integration of the ICT have the great impact on the teaching-learning process. In this research researcher tried to study these factors which hindrance or influence the integration of ICT in the teaching-learning process.

**Hota G. (2015)** Information Communication Technology (ICT) in Education: A Government of India (GoI) Initiative, *International Journal of Recent Advances in Engineering & Technology (IJRAET)*, 3(12), 41-44

Information communication technology (ICT) is a new weapon of Teaching-Learning. ICT provides effective Teaching-Learning means and provides huge amount of contents available in the world wide web (WWW). The world is moving around utilization of ICT in every sphere of life and our education system is untouched with this. Modern ICT is a combination of computer and Internet to exchange the information from one place to another place in a rapid way. This paper describes about initiative taken by the government of India (GoI) to promote and encourage ICT in Teaching-Learning process with limited ICT infrastructure as compare to developed country like USA.

**MNV P. (2015)**, ICTS in Teacher Education: Challenges and Remedies. *International Journal of Research Studies in Computer Science and Engineering (IJRSCSE)*, 2(3), 49-52.

Globalization and privatization have thrown up new challenges before educational planners. It is very important for qualitative improvement of education to prepare competent teachers. In order to ensure production of right type of teachers a sound program of professional preparation of teachers is essential; for this purpose we need to integrate Information and Communication

Technologies (ICTs) in teacher education programmes. One of the major shortcomings among others in the present courses is that the teacher-trainees do not get proper training in the use of ICTs. The teacher-educators themselves do not possess the necessary ICT skills. The author in this article avers that bulk of the faculty currently engaged in teacher preparation is neither prepared to use technologies (ICTs) nor has it updated its knowledge on technological developments.

**Rather S.A., & Kuraishy S. (2015).** Assimilation of Information And Communication Technology (ICT) In Education For Improving Teaching- Learning Processes: *A Critical Review of Literature, Reviews of Literature Impact Factor: 1.4716 (UIF) 2(6).*

The study is intended to appraise ICT at School scheme in Jammu and Kashmir launched by the Government of India in 2004 with an assignment to devise, catalyze and maintain Information and Communication Technology and ICT enabled activities and processes for improving access, excellence and competence in the school organization. Information Communication Technology (ICT) has contributed greatly to the improvement of education in schools globally. The use of Information and Communication Technology has fundamentally changed the education industry and the way knowledge is being transmitted from teachers to the students' (Haghighi and Eskandari 2012). The Government of India has taken a number of measures for implementing ICT in school education. The investigator has followed documentation technique for analyzing the data gathered from Ministry of Human Resource Development government of India, Education statistics of India, Census 2011 and DISE (Education Report Card). The findings of the study revealed that in spite of the initiatives taken by the government at Centre, the provision for incentives like national ICT award for teachers, the state government failed to implement the scheme. The centre government has approved smart schools and released funds but per contra to this, the state government requested for the cancellation of schools and returned the funds. The results revealed some contrary and mixed results as well. The results also shows that government at centre is committed to implement ICT at School Scheme in the country as a whole but the state government of Jammu and Kashmir is not serious and dedicated towards the implementation of the scheme. The analysis reveals that the scheme is sufficient to influence and improve the Indian education system.

**Sharma, Y. P. (2015).** Massive Open Online Courses (MOOCs) for School Education in India: Advantages, Challenges and Suggestions for Implementation. *Microcosmos International Journal of Research, 1(2), 1-5.*

Education is the backbone of any country. In India Right to Education encompasses the compulsory and free education to children between 6 and 14 years. But because of diverse sociological, geographical and political situation to achieve the target is far from reality. With changing time, new and innovative technologies make it possible to spread the seed of education to unreached and MOOCs (Massive Open Online Courses) are one among them. MOOCs have various advantages over traditional teaching but challenging too. Implementation of MOOCs for school education requires technical expertise along with army of trainers. MOOCs will provide

additional support to the learner as well teacher and also in teacher training programmes. MOOCs will be more beneficial for out of school children and in technical education. The MOOCs should be in blended mode and if Government adopts any strategy for certification as par with regular education, the MOOCs will be boon for India. A comprehensive model for MOOCs delivery is the need of the hour.

**Kavitha, T. C., & Ashok, D. (2015).** ICT: An Enabler and a Catalyst to Nurture Service Quality in Higher Education-A Review. *International Journal of Emerging Research in Management & Technology*,3 (2).

India has one of the largest higher education systems in the world, and has been witnessing healthy growth in its number of institutions and enrollment in the last few decades. The education system has seen a scorching growth over the last decade, trebling in size. In 2013, India had 727 universities, over 35,000 colleges and about 13,000 stand-alone institutions Education is recognized as one of the critical elements of the national development effort and Higher education, in particular, is of vital importance for the nation, as it is a powerful tool to build knowledge-based society of the 21st century. India is developing as a knowledge economy and it cannot function without the support of Information Communication Technologies (ICT). Importance of education in almost all walks of life has increased with the support of ICT. During the past 20 years, the use of ICT has fundamentally changed the working of education. In the current environment-conscious world, the importance of education and acceptability of ICT as a social necessity has been increasing. We can make our learning more engaging with the use of ICT, it can completely change how our education system works. ICT can help in enhancing the quality of education through blended learning by supplementing the traditional talk and chalk method of teaching. ICT, if used creatively, can make a big difference in the way teachers teach and students learn and can help students acquire 21st century skills like digital literacy, innovative thinking, creativity, sound reasoning and effective communication. Role of ICT act as an enabler for quality and market-responsive in higher education. But, Higher education in India is plagued by the challenges of inadequate technology access and inequity coupled with economic considerations and technological know-how, it remains to be seen how ICT can actually burgeon the students and how it can foster change. In this aspect, the paper reviews certain important issues related with the effective implementation of ICTs in Higher Education and provides suggestions to address certain challenges that would help in the implementation of ICTs in Higher education and concurrently increasing the quality of education.

**Chatterjee, P., & Nath, A. (2015).** The Future ICT Education in India—A Pilot Study on the Vision of Ubiquitous Learning in Higher Education. In *Information Systems Design and Intelligent Applications* (pp. 599-609). Springer, New Delhi.

India like any other knowledge economy depends strongly upon the development in education sector. Quality of its education significantly defines its academic capital and status of human resource. Research findings have often pointed out to the deficiency of technology enabled



quality education in India. The authors have tried out to identify the key issues to this disappointing scenario of ICT-enabled education in India. In this quest, it has been found that innovative use of ICT would help overcome different barriers like geographical, socio-economic and cultural constraints to a good extent. Implementing ICT in education primarily involves massive drives of digital literacy, development of requisite infrastructure, and devising of special measures to incorporate different ICT tools. ICT-enabled education would not only improve the quality of education but also redefine the traditional mode of learning to an interactive, efficient and interesting one. To review the scenario of ICT implementation in education and familiarity of students in the digital environment of education, a survey has been conducted over a group of students in India. The reports pointed out to the intense lack of ICT-enabled teaching methodologies. The authors have worked on proposing solutions for an inclusive development of the education standard and technique using ICT as a potential tool. Massive Open Online Courses (MOOCs) are also discussed in this perspective which has emerged as one of the most promising methods of catering Higher Education in an open and online fashion. In this connection, the authors have viewed MOOCs as a way to promote a Ubiquitous Learning environment in India which holds the potential in promulgating education to everyone and everywhere. Overall a vivid vision has been portrayed to sheath the existing education system in India with a technology cover which would not only improve the teaching-learning experience but also would show the way to ubiquitous learning in India, ensuring quality education for all.

**Tyagi R. and Singh R. (2015)** Status of ICT in Education and Support of Govt. of India, *International Journal of Engineering Research and General Science*, 3(1), 1323-1332.

Information and Communications Technologies (ICT) education is basically our society's efforts to teach its current and emerging citizens valuable knowledge and skills around computing and communications devices, software that operates them, applications that run on them and systems that are built with them. What are these things? How do they work? How do you use them productively? How are they deployed, assembled, managed and maintained to create productive systems? How they are used in specific business and industry settings? What are the underlying science and technologies behind them and how might those be developed to advance ICT fields? ICT is complex and quickly changing, and it is confusing for many people. It is so pervasive in the modern world that everyone has some understanding of it, but those understandings are often wildly divergent. ICT is used strategically in almost all businesses and industries. Many have developed specialized systems and uses of ICT, and many have specialized legal and regulatory requirements; quality control systems; integrations with production and research equipment and systems; security requirements; and software applications. For example: Bioscience industries rely on specialized ICT systems and applications to conduct research, analyze organic materials, produce biotech products and do required reporting; Financial services industries rely on ICT to maintain customer records, do business, conduct trades, do financial reporting, secure proprietary information and comply with regulations; Manufacturing industries use specialized computer controlled systems and robotics to design, produce and test products. Property management

operations use ICT to network and control heating and cooling, lighting and building access systems. Electric utilities use ICT to monitor and manage electricity distribution, customer billing and smart metering systems. Telecommunications, cable TV and other entertainment industries use ICT to store content, manage customers and deliver their services. We need to develop a competent workforce that understands not only relevant technologies, but also specialized business and industry environments and operations, to meet these specialized needs.

**MISHRA, P. (2015).** ICTs in schools: Why focusing policy and resources on educators, not children, will improve educational outcomes. *The Global Information Technology Report 2015*, 73.

Information and communication technologies (ICTs) have long been perceived as having the potential to transform education and student learning, especially in developing countries. The underlying belief of many initiatives has been that learning will happen if students and learners are provided direct access to ICTs. However, despite years of research, there is little evidence of the value of these approaches. Ideas such as the massive open online course (MOOC) and One Laptop Per Child (OLPC) project were initially hailed as the “next big thing” in education because they were seen as a way to offer access to education to all. But most studies show that these initiatives are failing to deliver: course completion rates on MOOCs are usually less than 7 percent, often because of a lack of personal contact. A similar cycle of hype and then disappointment has been seen in the much-touted Hole-In-The-Wall project. Although a well intentioned attempt to deal with the problems of access and other constraints in developing areas, it has not been successful in making any lasting or meaningful educational change. The main reason for the lack of success of these highly promoted projects is that they have ignored the single most important person in the education and learning experience of the child: the teacher. Decades of research have shown us that the most important contributor to raising educational outcomes in schools is clear: we need better educators. The single most important determinant of the educational outcomes for a child within a school is the capacity of his or her teacher, so it is on the teacher that we need to focus our attention. Outside the school, other factors such as socioeconomic opportunities also have significant impact, but that is beyond the scope of this chapter.

**Deepty, G. (2015).** *Teacher Education Curriculum in context of Information & Communication Technology*.

Today’s teachers need to update their knowledge and skills as the school curriculum and technologies are changing rapidly. Shift from Blackboard to Smart classrooms had changed the face of the modern classrooms. Information Communication Technologies (ICTs) can substantially support the education system if a teacher is enough competent to use the tools. For this the curriculum of teacher education system should also contribute for preparing prospective teachers. This research has been done to identify the gaps in the curriculum of teacher education system in context of ICT in perspective of the National Policies and Documents. The researcher has content analyzed the curriculum of 5 major universities in Delhi and National Capital Region

(NCR) and tried to give the suggestions for inserting component of ICT while preparing new curriculum for B.Ed. course.

**Khan R. (2015)**, Teacher Effectiveness: Role of ICT. *KIIT Journal of Research & Education, Special Issue National Seminar on Teacher Education- Today and Tomorrow*, 4(1), 61-63

Today's world is technological world. Technologies play an important role to bring change in many aspects of life. Education is also not an exception; it is also affected by the technology. As education is an important mean to fulfill the need of society. Thus it is also changing with the changing situation of the society. Teacher education is also in the state of reforms and innovations to produce good and effective teachers. These reforms and innovations should be based on logical understanding of present scenario and clear perception about future. Teacher effectiveness is concerned with the personal characteristics of teacher, teaching methods and techniques in relation to educational outcome. The use of ICT has fundamentally changed the practices and processes of teaching learning process. The use of technological tools like: overhead projector, radio, DVD player are very common which help to advance the teacher effectiveness. The use of internet with ICT has made a transformational effect in the field of education. Thus it is recommended that all teachers training institutes should provide training to use technological tools and software to make their teaching effective. This paper provides brief description about the importance of ICT. It also describes various online sources which facilitate teachers for effective teaching. This paper also provides information about various factors determining the use of ICT for effective teaching. Thus the purpose of this paper is to discuss why education is better with the addition of ICT and how it can contribute to enhance teacher effectiveness.

**Maheswari & N. Ramakrishnan (2015)**. Effectiveness of CAI Package on Achievement in Physics of IX Standard Students. *i-manager's Journal on School Educational Technology*, 10(4), 28-34.

The present study is an experimental one in nature, to find out the effectiveness of CAI package on in Physics of IX std. students. For this purpose a CAI package was developed and validated. The validated CAI package formed an independent variable of this study. The dependent variable is students' achievements in physics content. In order to find out the achievements in Physics among IX standard students, the investigator developed and standardized an achievement test on Physics unit entitled "Work, Power and Energy" prescribed for IX std. by Tamilnadu Textbook Society. It is a pre-test-post-test equivalent group design. In order to have randomization in the sample the investigator selected two schools in Madurai city. The Experimental and Control groups were identified in both these schools. Before the treatment both experimental and control groups were equated based on their performances in entry level test. The selected experimental and control groups were administered Pre test, developed and validated by the investigator. The treatment was conducted in four equal sessions. After all the treatments both the groups were administered Post test. Data were collected from the students. They were tabulated and statistical treatments were applied. The analysis results are discussed in this paper.

**Kaur N. (2015)**, Using ICT in Empowering Teachers for Quality Education, International Journal of Scientific Research Engineering & Technology, EATHD-2015 Conference Proceeding, 14-15 March, 2015.

The quality education depends upon the quality of teachers. Teacher education plays a vital role in developing quality education which is the present requirement in the modern information & communication era. Teacher's educators are the basis producing the future teachers who are the pillars of nations. The quality of teacher education programmes depend on the quality of teacher educators who are the teachers of teachers. They should be well equipped with the latest knowledge in their subject by undergoing orientation & refresher courses, seminar etc., management skills, communication skills, good qualities to inculcate among the teachers trainees. Teacher's educators should be a friend, philosopher and guide to teachers trainees and be a role model to the teacher trainees. A teacher with technology is the need of the hour. The techno-teacher is one who integrates the content with technology in the classroom. The teacher has to use the simple technology to higher technology that is black board to space-board. The Information Communication Technology (ICT) heralds the world of knowledge on the screen hence the learners learning will be enhanced in a split of second meeting the demands of the society at large. Education is the backbone of a nation. The introduction of ICTs in the education has profound implications for the whole education process especially in dealing with key issues of access, equity, management, efficiency, pedagogy and quality. Information and communication technology (ICT) is a force that has changed many aspects of the way we live. In developing countries, education is also linked to a whole batch of indicators of human development. Education of women influences the health of children and family size. The experience of Asian economies in particular in the past two decades has demonstrated the benefits that public investment in education can bring. Integrating ICT in teaching and learning is high on the educational reform agenda. Often ICT is seen as vital tool to fully participate in the knowledge society.

**Ganiger, B., and Goel, D. (2015)**. ICT Aided Constructivist Learning Approach for the Professional Development of Pre-Service Teachers. *Education India Journal: A Quarterly Refereed Journal of Dialogues on Education*,4(4), 75-98

Technology has revolutionized all domains of the society; it has penetrated into every aspect of the social and cultural lives. Education is not an exception but teaching and other educational endeavors have not taken full advantage of these changes. The schools have remained in the past, while our children are much ahead. In the Science classroom teachers present the knowledge to children in a linear, didactic manner that differs significantly from the children's previous experience outside the school which results into mismatch between the learner and the society. Previous experiences of the learners play vital role in learning new things, here comes the application of Constructivist philosophy. It has become the latest catchword in educational circle which is applied to both learning theory and epistemology. It is basically a learner centred approach. ICT can transform the learning environment into one that is learner centred. It

encourages active and collaborative learning. Only ICT implementation into education cannot do miracles. ICT should be integrated with certain learning theories. The present situation needs a paradigm shift and willing abandonment of familiar perspectives and practices and the absorption of new ones like constructivism. It demands the role of teacher as a facilitator who encourages learners to reflect, analyze, design and develop the process of knowledge construction.

**Jegan, M., & Pazhanivelu, G. (2015).** Status of ICT Enabled Teaching Practices In Upper Primary Schools of Nagapatinam District. *Asia Pacific Journal of Research*,1(24), 35-42

Public Elementary Education was free and compulsory in most European countries. Some countries also provided free secondary schooling. Today, the idea of free and compulsory education has taken root throughout the world. Almost all countries have adopted the plan of educational organization used in the West that is the division into childhood, elementary, secondary and higher education. In India Elementary Education is free and compulsory. Children learn different subjects at this level. ICT plays a vital role in present days, significant changes over the past decade in ICTs have many aspects of our lives – including booking tickets, banking, using search engines for information, communicating with friends, colleagues and participating virtual professional and social networks. The usage of ICTs incorporated with day-to-day activities, so the usage of ICTs take part in pedagogical process itself most of the studies and practical experiences in foreign and India reveals the important and usefulness of ICT in education at various levels. The background study on the research problem assisted the investigator to make the following observations. It was found that the status of ICT enabled instruction is not at a satisfactory level in our country. The present curriculum of the upper primary schools also recommended the technology based instructions. In National Policy of Education (1986), the Programme of Action (1992) and the National Curriculum (1988, 2000, 2005) there has been a lot of emphasis on achieving universalization of elementary education in a time bound manner. SSA is a response to the demand for quality elementary education all over the country. SSA provides an opportunity for improving capabilities of all children, through the variety of media and methods. The studies have shown that technology based instructions are more effective than traditional method. They also involved certain problems in the use of ICT like insufficient infrastructural facilities in government schools and lack of trained teachers in private schools. Keeping all those facts in mind, the researcher intends to take a close look at the infrastructural facilities, usefulness of in-service training, availability of administrative support, the response of the students for ICT enabled teaching and utilization of ICT in upper primary schools of Nagapatinam District.

**Shrivastav, P., & Garg, I. (2015).** Impact of Learning ICT as a Subject on Secondary School Students' Self-Regulation. *Educational Quest*, 6(1), 47.

Today technology is an inherent part of our lives. All the organizations have identified the importance of Information and Communication Technology (ICT). ICT plays an important role in improvement of educational sector too. ICT helps us in getting information from all over the

world. It helps us to bring the world under one roof. Thus the students in the school need to be trained in ICT and its use. With this in view Government of Maharashtra in India introduced ICT as a subject for Std. IX students of Secondary School Certificate (SSC) Board in aided as well as unaided schools. This study deals with the impact of this newly introduced ICT subject on Std. IX students' self-regulation and its seven dimensions. It is an outcome evaluation study. 1041 students from 21 SSC Board schools from Greater Mumbai were the respondents. Comparison of self-regulation of students from different type of schools indicates that unaided school students are better in their self-regulation.

**Yadav R., (2015)** Attitude of Secondary School Teachers Towards The Use of Information Communication Technology In Education, *International Journal of Education and Information Studies*,5(1), 31-33.

Information and communication technologies (ICT) has emerged as one of the most important aspects of human life and it has affected every aspect of school working including administration, time table, lesson delivery, project work, evaluation, examination system etc. ICT have made teaching-learning process more relevant for the learner and connected to real life. In present study, attitude of secondary school teachers of Rewari district towards the use of information communication technology in education was studied.

**Dixit, M., & Kaur, M. (2015).** Attitude of Teachers Trainees towards ICT Teaching. *International Journal of Pure and Applied Researches*, 1(1), 169-174.

This study was conducted to find out attitude of teachers trainees towards information and communication technology teaching .The sample consisted 200 teacher-trainees from Moga district of Punjab state. ICT teaching attitude scale (ICTTAS) developed and standardized by T. Pardeep Kumar (2013) was used to collect the data. The statistical techniques were used the mean, standard deviation, t-value. The results showed that the factors like locality and gender of the of teacher-trainees influence attitude towards information and communication technology teaching.

**Mohan L. R. & Kumari A. (2015)** A study of the use of ICT in Science Pedagogy for Quality Teacher Education, *KIIT Journal of Research & Education*, 4(1), 77-90.

Integrating ICT into the teaching/learning process has great potential to enhance the tools and environment for learning. Research and experience have shown that ICTs, well used in classrooms, enhance the learning process in many ways Present study was undertaken to find if the use of ICT enhances quality teacher education. The objectives of the study were (1)To study the existing status of the use of ICT in science pedagogy (2) To find the barriers in integrating ICT in science pedagogy. (3) To find if ICT integration can contribute in Quality Teacher Education The sample comprised of 120 trainee teachers from 4 B.Ed colleges of Delhi were ICT is used in science pedagogy. Also Science teachers of the respective B.Ed Colleges.A self constructed questionnaire and observation schedule were used for data collection. Also informal

interviews were conducted with teacher educators and student teachers. Results showed that use of ICT in science pedagogy enhanced quality education to some extent. Also lack of training was the greatest barrier in integrating ICT in science pedagogy.

**Deka, B. (2015).** Potentialities of ICT in open and distance learning system with special reference to north east India. *International Journal of Research in Economics and Social Sciences*, 5(8), 63-69.

In a huge country like India where the fruits of development are not equally distributed, the importance of ODL system is tremendous. ODL system is being adopted throughout the world as an important tool to ensure access, equity and quality in the realm of higher education. Information and Communication Technology (ICT) is playing a vital role in open and distance learning (ODL) to meet the requirements and expectations of the learners'. It is difficult to perform the same using any traditional institutional system due to its limited resources. ICT has various proven tools and technologies to meet the requirements of a learner at various phases of learning cycle viz the admission phase, the learning phase, the evaluation phase and finally the certification phase as a service. This paper is an attempt to study the growth of ODL system in North East India; the potentialities of ICT in the field of distance education and the issues and challenges on using ICT in an ODL setup.

**Agrawal, A., Kumar, A., & Agrawal, P. (2015).** Massive open online courses: EdX. org, Coursera. com and NPTEL, a comparative study based on usage statistics and features with special reference to India. INFLIBNET Centre, 978-93-81232-05-7

Internet and communication technologies (ICT) have changed the way we perceive education. ICT has major impact on recent evolving Education Technology field. Internet and smart phone users are growing at rapid pace in the world as well as India. Leveraging technologies to solve India's higher education problem is the key. A massive open online course is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials such as filmed lectures, readings, and problem sets, many MOOCs provide interactive user forums to support community interactions between students, professors, and teaching assistants (TAs). The present paper is an effort to analyse and compare two of the world's most widely used MOOCs i.e. EdX.org and coursera.com with MHRD funded India's own e-learning initiative NPTEL which provides open courseware to engineering students across the globe. This paper compares these three platforms of e-learning based on parameters like the usage statistics available, features, technology platform and other parameters like design approach to content etc. This paper is an effort to derive best practices from world class MOOCs and adapt them for India's e-learning initiative NPTEL- a portal dedicated to technical e-content

**Rose, A., & Kadvekar, S. (2015).** ICT (Information and Communication Technologies) Adoption Model for Educational Institutions. *Journal of Commerce and Management Thought*, 6(3), 558

It is well known that implementation of technology as an enabler in the education system is complex. Right from introducing the technology to advanced use of it, and anywhere in the world, technology implementation has been a research topic for many. Education settings, users, government policies, basic infrastructure availability, performance pressures, leadership – reasons galore. Moreover, it is just not implementation but even taking a first step of thinking about technology in education itself is not all that easy. The research in case has identified exact challenges faced by the higher education sector in adopting information and communication technologies or ICT. Though challenges may sound to be easy to list, researchers have taken efforts to identify reasons from various stakeholders (owners, heads of institutions, professors, students) to bring a completeness in the outcome. Going beyond, the study suggests ICT adoption model, very specific to higher education academia in India. The model is being tested already and has been recommended as a policy measure to the challenges faced in ICT adoption. Though the study has been conducted from the perspective of Indian higher education sector, researchers feel the ICT Adoption Model can be applicable to other sectors and regions too.

**Joshi,S.P., & Late Shanakararao (2014).**An Analysis of ICT integrated Continuous Comprehensive Evaluation at Secondary School from Buldhana District, Maharashtra (India), *InternationalEducationalE-Journal*,3(3).

The present study was carried out in selected Secondary School of Buldhana District (M.S.) focuses on how ICT integrated evaluation approaches can effectively implement CCE system at secondary level. The study reveals that ICT can play a vital role in CCE system by providing effective support to formative evaluation in terms of rubric evaluation for learners' assignments, projects and teachers' lessons, powerpoint presentation and CBDT giving enough opportunity to the teacher to self evaluate their own teaching as well as diagnose their students' difficulties and provide subsequent remedies to them in a more practical way. In addition, learners can themselves evaluate their performance efficiently. By availing the opportunity of self training on 'CCE implementation' ICT makes the relevant State Board directives and the knowledge of use of various evaluation tools and techniques crystal clear to all teachers in a more effective and economic way. It can establish CCE as a successful flexible examination system by systematizing projects, assignments and other activities meant for the purpose of evaluation and thus reducing learners' stress. In addition, ICT helps teachers to accomplish their paper work and manage their time adequately by assisting them to track their learners' holistic development (both scholastic and co-scholastic) in a progressive and cumulative manner. Through eportfolio and rubrics teacher and the school authority can assess learners' co scholastic skills in a more effective manner. However, to make CCE internally accepted and really successful operational knowledge of ICT integrated evaluation tools and techniques on the part of teachers is essentially needed.

**Banerjee, S., Mandal, K. S., & Dey, P. (2014).** A Study on the Permeation and Scope of ICT Intervention at the Indian Rural Primary School Level. *Journal of ICT Primary- Education IIMS*,1(2) 363-370.



The provision of education for all in India remains a distant dream, despite substantial amounts of government and state investment going into it. The objective of this study is to highlight an alternative learning model that makes use of the e-revolution that has proliferated into every aspect of our lives. Although there have been attempts to incorporate ICT into rural classrooms, most of the focus has been on video-based digitized learning and has not efficiently addressed the best ways in which learning can be achieved. Our aim is thus to design a model that not only makes e-learning effective, but replaces the underqualified teachers in remote areas and allows for the free permeation of education in ways that might bridge the digital divide amongst students of various socio economic backgrounds. In this context our intervention focuses on a class of 16 students, 10 to 11 years of age (class 5) at Ma Sarada Shishu Tirtha, a school for tribal girls, located in Krishnanagar, West Bengal, India. The intervention involved a remote teacher delivering Math and English lessons in a class-room setting, (via the video conferencing software Skype, and PowerPoint Presentations) while also making the session interactive.

**Thakur, G. K. (2014).** ICT and Digital Divide in Indian School System. *International Journal of Interdisciplinary and Multidisciplinary Studies (IJIMS)*, 2(2), 34-38.

The education system across the globe has undergone major transformation with the exceptionally fast paced change in technological domain of knowledge. As a result, ICT in its own way has managed to make a permanent place for itself in education sector – specifically in school education. Still, if we look into the situation and assess the pace with which ICT has made its place in school system, we find the situation not so convincing. Our schools, mainly govt. schools are ill-equipped in terms of infrastructure and basic facilities, our teachers are not trained adequately to infuse ICT in education, and execution of many enthusiastic policies are done half-heartedly, thus leaving the less privileged segment of children, who come from lower socio-economic class of society and are largely dependent on govt. school system for their education, with very little or no access to digital learning. This frustrating situation creates a „digital divide“, which refers to the gap between people with effective access to digital and information technology and those with very limited or no access at all. It includes the imbalances in physical access to technology as well as the imbalances in resources and skills needed to effectively participate as a digital citizen. This paper attempts to look into the status of ICT facilities in the govt. schools of Uttar Pradesh. The paper examines as to how far the govt. policies and efforts have been able to bridge this digital divide.

**Kanvaria, V. K. (2014).** Computer Technology and Teaching System: Interaction and the Challenges Ahead. *Journal of open schooling*, 5(1),88.

While having a close look at the rapidly increasing use of computer technology in the teaching and learning process, there is need to interact with teaching system through use of computer technology and the challenges ahead. The current paper throws light upon the teaching system and interaction with various elements of teaching system like method, material, learner and colleagues through computer technology. It also briefly discusses about challenges already met

and challenges ahead in this direction. Undoubtedly, meeting these challenges would certainly help in judicious and proper use of computer technology in the field of education.

**Pegu, U. K. (2014).** Information and communication technology in higher education in India: Challenges and opportunities. *International Journal of Information and Computation Technology*, 4(5), 513-518.

The focus of this paper is to examine the role of Information and Communication Technology (ICT) in higher education in India. The emergence of ICT has fundamentally changed the practices of not only business and governance but education as well. While the world is moving rapidly towards digital media, the role of ICT in education has become increasingly important. There has been an unprecedented growth in the use of ICTs in teaching, research and extension activities. The sudden boom in Information Technology has transformed the way how knowledge is disseminated today. One of the changes it has brought about is the way how teachers interact and communicate with the students and vice-versa. Given the fact that higher education in India is plagued by the challenges of inadequate technology access and inequity coupled with economic considerations and technological know-how, it remains to be seen how Information and Communication Technology can actually burgeon the students and how it can foster change in this aspect. Moreover, this paper explores the emancipator and transformative potentials of ICT in higher education in India. Finally, this paper assesses how Information Technology has facilitated the growth in interactive learning and what has been its impact in the higher educational scenario in the country.

**Byker, E. (2014).** ICT Oriented Toward Nyaya: Community Computing in India's Slums. *International Journal of Education and Development using ICT*, 10(2), 19-28.

In many schools across India, access to information and communication technology (ICT) is still a rare privilege. While the Annual Status of Education Report in India (2013) showed a marginal uptick in the amount of computers, the opportunities for children to use those computers has remained stagnant. The lack of access to ICT is especially common in India's urban slum areas, which is privy to the "Matthew Effect" where the poor become poorer based in part on the scarcity of high-tech resources. This article's purpose is to describe and report on ICT program interventions that target young people living in India's slums. Specifically, the article examines a case study of a grassroots effort, called the community computing model, in Bangalore, India. Using Amartya Sen's work on nyaya and Paulo Freire's work on concientization, the article explains how this model of community computing infused and developed a social justice oriented and deeper "critical consciousness" of the slum community where this computer center was situated.

**Goswami, C. (2014).** Role of Technology in Indian Education. *International Proceedings of Economics Development and Research*, 79(2), 6-10.

There is an emerging broad consensus around the world about the benefits that can be brought to education system through the appropriate use of evolving information and communication technologies. The range of possible benefits pervaded practically all areas of activity in which knowledge and communication play a vital role. It is involved from improved teaching and learning processes to better student outcome, increased student engagement and seamless communication with teachers and parents. Today there is a significant gap between knowledge and skills students learn in school and the knowledge and skills that workers need in workplaces and communities. Employers report that they need students who are professional, having good moral and work ethics, can collaboratively work in team, have critical thinking and problem solving ability, can lead a group of people and are skilled in verbal and written communication. This paper is to study role of Education Technology in India.

**Gupta, M., & Gupta, V. K. (2014).** The Virtual Classroom redefines by ICT: Enhancing eminence education through successful implementation of ICT with special reference to Rajasthan schools. *International Journal of Application or Innovation in Engineering & Management*.3(4),123-128.

A virtual classroom is an online learning environment that contains all course materials. The conception of the virtual classroom has made it possible for learners to tackle the features of the Internet to create meaningful and constructivist learning environments Information and Communication Technology (ICT) is playing a vital role in teaching and learning to meet the needs and anticipation of the learners' in large scale. The main purpose of ICT in education means implementing of ICT equipment and tools in teaching and learning process as a media and methodology. The purpose of ICT in education is generally to make students familiar with the use and workings of computers, and related social and ethical issues. Due to miscellaneous requirements in teaching and learning for a Virtual Classroom, there are opportunities and challenges that are to be addressed in usage of the technology and the service(s) being provided through ICT. The paper emphasizes on the concept, role of teaching and learning and to promote easily manageable, affordable eminence higher education in terms of its availability, authenticity, confidentiality and access control so that one can ensure a service to the outmost satisfaction of a learner.

**Gupta, N., & Thakur, S. (2014).** The Effectiveness of IT Enabled Teaching in Classroom Environment. *International Journal of Scientific & Technology Research*, 3(5), 61-65.

During the last two decades the process of teaching and learning has changed to a large extent. Earlier, when there used to be bulk of hard books and innumerable pieces of paper to deal with, the present scenario is altogether different. The reason behind such a dramatic change is attributed to ICT (Information Communication technology), wherein the adoption of IT tools in the education environment has a significant impact on the framework followed by different institutions and organizations in teaching –learning process. The use of ICT in education is not limited to the teaching of any specific subject; instead it has a broader horizon to deal with, incorporating the use of Audio-Visual aids, Experimental tools, manipulators, dramatization,

thus enhancing the Creativity of both the educator and the learner. The following report analyzes the impact of ICT on the performance of students in different subjects.

**Srivastava, T. K., Waghmare, L. S., Jagtap, A. T., Rawekar, A. T., Quazi, N. Z., & Mishra, V. P. (2014).** Role of information communication technology in higher education: Learners perspective in rural medical schools. *Journal of clinical and diagnostic research: JCDR*, 8(6), XC01-XC06).

Background: Higher education has undergone profound transformation due to recent technological advancements. Resultantly health profession students have a strong base to utilize information technology for their professional development. Studies over recent past reflect a striking change in pattern of technology usage amongst medical students expanding prospects exponentially by e-books, science apps, readymade powerpoint presentations, evidence based medicine, Wikipedia, etc.

Aim & Objectives: The study was undertaken with an aim to explore the general perceptions of medical students and faculties about the role of Information Communication Technology in higher education and to gauge student's dependence on the same for seeking knowledge and information. Study Design: Cross-sectional, mixed research design. Materials and Methods: The study was conducted in Department of Physiology, Datta Meghe Institute of Medical Sciences(Deemed University). Study population included students (n=150) and teaching faculty (n=10) of Ist phase of medical curriculum. The survey questionnaire (10 closed ended and 5 open ended items) and Focus group discussion (FGD) captured the perceptions and attitudes of students and faculties respectively regarding the role and relevance of technology in higher education. Observations and Results: Quantitative analysis of closed ended responses was done by percentage distribution and Qualitative analysis of open ended responses and FGD excerpts was done by coding and observing the trends and patterns respectively. Overall the observations were in favour of increasing usability and dependability on technology as ready reference tool of subject information. Learners valued textbooks and technology almost equally and regarded computer training as a desirable incorporation in medical curriculum. Conclusion: Role of technology in education should be anticipated and appropriate measures should be undertaken for its adequate and optimum utilization by proper training of students as well as facilitators.

**Ahmed M., I. Patel & Ali, M. A. (2014)** Information and Communication Technology in Secondary Schools Advantages and Disadvantages. *Conflux Journal of Education*, 2(4).

The world is fast becoming a global village as a result of the development in information and communication technology. Information and communications Technology (ICT) has the potential to improve all aspects of our social, economic educational and cultural life. ICT has played an important role in formal and non-formal educational settings; ICT is being utilized in every part of life. Education even at school stage has to provide computer instruction. Technology when it fits comfortably with the curriculum or instructional plans of teaching is an

indicative of integrated technology. Thus, technology rather than an additional layer in the classroom is embedded within the design of the teacher's lesson plan and the pedagogy.

**Upasana, K. M. (2014).** A comparative study of traditional education. Education with special reference to India. *International Journal of Research in Business Management*, 2(5), 149-162.

Today's we all lives in a 21st century, everything changed very rapidly & continuously for the betterment of future, new technology is simply a modified version & a technique to overcomes the drawbacks of previous one, that's proves very beneficial for all. In the era of globalization, traditional education system is losing its relevance. Role & importance of e-education in areas like commerce, management, IT etc. is increasing day by day. India too acknowledges importance of e-education in dissemination of knowledge.

**R, Senthilkumar; C, Sivapragasam; & B, Senthamaraikannan. (2014).** Role of ICT in Teaching Biology. *International Journal of Research*, 1(9), 780-788

This study reveals that Education has been described as means to modify the behavior. Biological science deals with study of living organism, their living environment and various interactions between living things and environment. The traditional content of biology has been replaced by modern discoveries in the fields of cell biology, basic genetics, bioengineering and biotechnology. Biology as a subject has both theory and practical components. ICT has opened new avenues like, online learning, e-learning, virtual university, e-coaching, e-education, e-journal, etc. It has provided opportunity for the learner to use maximum senses to get the information. . Learning of biology can be made easier and more comfortable by integrating ICT tools in instructional strategies for teaching biology. The students of biology can make use of ICT for easy understanding. ICT can change traditional classroom into smart classroom and improve teaching-learning process in biology.

**Nayar K, A., & Barker, M. (2014).** Computer labs as techno-pedagogical tools for learning biology-Exploring ICT practices in India. *In Asia-Pacific Forum on Science Learning & Teaching*, 15(1), 5-24

In Indian secondary schools, as in many countries, Information and Communication Technologies, ICT, are changing the image of learning places, the roles of teachers and students, and often the entire classroom learning ambience. This study investigates current practices for learning biology in school computer labs in India in the light of the existing Indian pedagogical practices. The increasing availability of technology-based learning resources has increased the techno-pedagogical possibilities (i.e. the possibilities for pedagogical use of technology) in biology learning, and many schools are augmenting their ICT infrastructure by setting up fully-equipped computer labs. Nevertheless, the teaching of biology currently continues to be partly in the traditional classroom and partly in the computer labs. In fact, most schools are not yet willing to invest large amounts in computer infrastructure, despite school policies that encourage

teachers to make use of ICT learning resources made available out of state-provided funding. In this study, biology teachers' techno-pedagogical perspectives and the nature of secondary school students' ICT skills deployed in computer labs are explored.

In terms of results, we report that teacher ratings on the techno-pedagogical skills they require while teaching biology in computer labs revealed that they were, in fact, well aware of the wide ranging technological possibilities: text processing, website development, spreadsheets, layouts and multimedia. Again, observations of the lab sessions themselves revealed that students were deploying significant ICT skills: text processing, information retrieval, information processing and information gathering. Also, it turned out that the teachers were actually employing the imaginative range of the skills that they had espoused in their chosen ratings. In summary, when computer labs became the sites for learning biology, the combination of the ICT provided, together with the teachers' emerging techno-pedagogical practices, presents heartening possibilities for promoting student learning in India in the future.

**Seenivasan. M and N. Ashok Kumar (2014).** Status of Higher Secondary School Libraries in Thiruvallur District. *i-manager's Journal on School Educational Technology*, 9(3),18-22.

Libraries are the main sources of knowledge. They play a major role in fostering reading habit among school children. Hence, it is deemed interactive to study the status of higher secondary school libraries in Thiruvallur District, Tamil Nadu. For the Analysis 50 Higher Secondary Schools were selected randomly comprising of Government Higher secondary school, Government Aided Higher Secondary School, Private Matriculation Higher Secondary School and Kendriya Vidyalaya from Thiruvallur District. Questionnaires were distributed to the Headmasters/Principals of those schools who participated in the survey. The collected data has been tabulated and analyzed using Simple Parentage Analysis. The result showed that 35 schools (70%) have libraries; whereas 15 schools (30%) don't have libraries in their schools. It is also found that only 27 schools (54%) have appointed fulltime librarians, but 23 schools don't have qualified librarians. From the results, it has been concluded that the school libraries functioning in Kendriya Vidyalaya's and Private Matriculation Higher Secondary Schools are in a remarkable state, where as Libraries in Government Higher Secondary Schools and Government Aided Higher Secondary Schools are in a poor state.

**Banerjee G. (2014),** ICT Development in India: current scenario. *International Journal of Current Research*, 6(1), 4685-4689

The revolution in the information and communication sector is making the world united. In today's world information and communication technology (ICT) is a key parameter for economic development. Presently India is 121st position in ICT Development Rankings out of total 157 countries. Though the value of the index increased from 2.13 in 2011 to 2.21 in 2012 India's overall ranking slashed down from 120 to 121 during this period. Hence India has to improve its status regarding ICT if it wants catch up its development goal. Present study tries to analyse the trend and pattern of ICT in India and its impact on Indian economy. The study found that though

the state of development of ICT in India is increasing in past few years, but still it is far from being satisfactory. Suitable policy prescriptions by the government are necessary for ICT to become one of the key engines of economic development in India.

**Kaur, S. (2014).** Importance of ICT in Education for Gifted Students. *Issues and Ideas in Education*. 1(2), 211-219.

Gifted and talented children are those who are identified by professionally qualified persons who by virtue of outstanding abilities are capable of high performance. These are children who require differentiated educational programs and services beyond those that are normally provided by the regular school program in order to realize their contribution to self and society (Marland, 1972). A gifted child in the regular classroom may be the only child in the room; hence, he or she will not have the opportunity to learn with others of like ability. ICT can provide opportunities for students to develop and practice higher level thinking skills. The gifted students are spread around the world and ICT makes it possible that gifted students communicate with other gifted students all around the world. ICT can be used to acquire that type of knowledge which can satisfy the needs of the gifted children. So, the purpose of this paper is to determine the use of technology in education for the learning of gifted and talented students.

**Wasim, J., Sharma, S. K., & Siddiqui, J. (2014).** ICT Integration in India: Approaches Taken and to be Taken. *IJCER*, 3(1), 20-25.

In the presence of great social diversity in India, it is difficult to change the social background of students, parents and their economical conditions. Therefore the only option left for us is to provide uniform or standardize teaching learning resources or methods. For high quality education throughout India there must be some nation-wide network, which provides equal quality education to all students, including the student from the rural areas and villages. This paper addresses about higher education impacts on learning by the integration of ICT (Information and Communication Technology) for education activities in India by assessing its readiness, the factors which lead to the successful implementation of the projects and measuring those initiatives impact on the educational ecosystem.

**Manisha & Anju (2014).** The Role of ICT in Higher Education in India. *International Journal of Enhanced Research in Management & Computer Applications*, 3(11), 16-19.

Information and communication technologies (ICT) have become commonplace entity in all parts of life. Across the past twenty years the use of ICT has fundamentally changed the practices and procedures of business and governance, education. The role of ICT in education is becoming more and more important and this importance will continue to grow and develop in the 21st century. Use of ICT in education field leads to more student-centred. This paper highlights the various impacts of ICT on higher education and explores various potential future developments.

**Kumar M. (2014)**, Role of ICT in Enhancing Teacher Education. *International Journal of Multidisciplinary Research and Development*, 1(7), 386-388

Information and Communication Technology (ICT) has become one of the basic building blocks of modern society. It has an important role to play in changing and modernizing educational systems and ways of learning. Information communication Technology has opened new challenges for teacher education. In the Present era education system faces the challenges to prepare individual for the information society in which one of the most important aims is to handle information. Teacher education system empowered by ICT-driven infrastructure can have a great opportunity to come up to the center stage and ensure academic excellence, quality instruction and leadership in a knowledge-based society. For this purpose it is essential to create in the teachers an awareness of the possibilities of ICT which will lead to their willingness to learn it and resulting in the commitment and confidence to use it. The effective use of ICTs depends largely on technically competent teachers. The paper discusses role of information communication technology in enhancement of teacher education and also suggest the measures.

**Patra J.N. (2014)** The Role of ICT in improving the Quality of School Education in India, *International Educational E-Journal, {Quarterly}*, 3(2), 337-345.

Benefit of ICT in School Education – Like other developing countries, India uses ICT as a teaching tool. Its potential for improving the quality and standards of pupils' education is significant. General benefit

- Enable grater learner autonomy,
- Enable tasks to be tailored to suit individual skills,
- Enable students to demonstrate achievement in ways which might not be possible with traditional methods,
- Unlocks hidden potential for those with communication difficulties.

ICT benefits for students- Students using voice communication aids gain confidence and social credibility at school in their communities, Increased ICT confidence amongst students motivates them to use the Internet at home for schoolwork and make their curiosity fulfill, Computer can improve independent access for students to education, Students with profound and multiple learning disabilities can easily communicate more, Visually impaired students using the internet can access information along their sighted peers. ICT benefits for teacher, non-teaching staff-

- Using the ICT gadgets teachers can easily represent their lecture,
- Teachers make interesting and fruitful their teaching by using ICT. Non-teaching staff easily store the recodes in computers,
- Reduces isolation of teachers working in special Educational needs by enabling them to communicate electronically with colleagues. Enhances professional development and the effectiveness of the use of ICT with students through collaboration with peers. Improving the skills of staff a greater understanding of access technology used by students.

ICT benefits for parents-

- Not only learners, teachers, non-teaching staffs but also parents to have higher expectations of children's sociability and potential level participation may occur by ICT,
- Parents also have updated themselves by using ICT.

Barriers- In Indian school education system ICT have a great role to enhance the quality of education. Out of 150 smart schools 63 smart schools have so far been approved in 12 States and



3 UTs under ICT in Schools Scheme. But, unfortunately there are some barriers to make the school education completely

ICT based. They are as follows-

Lack of teacher's competency to handle ICT equipment's, is one of the biggest barrier in Indian school education system for making it ICT based, Lack of infrastructures and equipment's are another problems for back warding Indian school education than other country, Lack of interest in teachers and learners keep the Indian school education to his past place, Lack of investigation for fruitful the schemes of ICT.

Conclusion- Quality in education through ICT and its awareness among stakeholders will have positive impact on the society. ICT can be helpful in quality and standards of education by implementing it in various phases of education. ICT can be employed in formal and Non-formal types of education and would eventually make the learners employable and socially useful part of the society. By employing ICT in teacher training can save a lot of money of the Government. Moreover a lot of qualitative improvement can be seen as resource persons for the training can be best of the world. By employing ICT in administration can help in solving the problem of Absenteeism of students and teachers. Good quality content is one of the major issues and directly affects the standards of education and quality. By overcoming the certain challenges involved in the process of education can help a lot in this side. Conclusively a lot of quality improvement is possible after careful and planned implementation of ICT in school education by various stakeholders.

**Poonam &Bala (2014).** Teacher's Perception about Provisions of ICT in School Management. *Indian Streams Research Journal*, 4(1), DOI: 10.9780/22307850, <http://isrj.org/UploadedData/3646.pdf>

This paper describes teacher's perception about provisions of ICT in school management. This article is part of research entitled "A comparative study of Government and private school with respect to ICT in educational management." The study was conducted among senior secondary Govt. and private teachers of East Delhi, which included 5 Govt. and 5 private schools of the same area. The numbers of respondents were 50. The findings revealed that most of teachers have a good knowledge about provisions of ICT in school management. There was a difference in opinion of Govt. and private school teachers about provisions of ICT in school management due to availability and non availability of ICT equipments in school. A questionnaire was conducted to carry out a comparative study of Govt. and private school teacher's perception about provisions of ICT in school management.

**Dave N. (2013),** Dependability of ICT and English in Education, 'ICT & Innovations in Education'. *International Electronic Journal*, 1 (2), 6-8.

The article concentrates upon the uses of both English language and Technology as without these two the existence of plentiful fields is impracticable. It discusses on the subject of the significance of English in the field of Technology and gradually followed by the descriptions,

comments and examples of vary fields in which both English and Technology are utilized. It is considered as the best integration to search, to increase, to accomplish, to realize, to obtain, and to achieve. Both English and Technology are the provisions correlated and can create immeasurable opportunities and possibilities.

**Hashemi, B. (2013).** The investigation of factors affecting the adoption of ICTs among English language Teachers in ESL context. *International Journal of Language Learning and Applied Linguistics World*. 4(1), 55-70.

Language and technology are two major focuses of reform in education, teachers of English language have to cope with the challenge of technological and pedagogical shifts occurring in the teaching profession. Extracted from his PhD thesis the purpose of the researcher in the present study is to investigate the factors affecting the adoption of Information and Communication Technology (ICT) among English teachers in English as a Second Language (ESL) context by means of a quantitative study. First, using a validated and reliable questionnaire consolidated and inspired by other researches done in the field, the researcher elicited the point of view of 217 English teachers about the mentioned factors. The data collected from the questionnaire was entered into SPSS software for further analysis. One sample t-test, multiple regression and ANOVA were used for analysis and testing of the hypotheses. The results demonstrated that three factors proposed by the researcher were confirmed as active on the adoption of ICTs among teachers. The priority of the factors based on their views was: perceived usefulness, ICT knowledge to use and support language teaching and learning, respectively. Finally, based on the findings of the study and other reviewed guidelines, the researcher proposed some useful suggestions for English teachers and English Language Teaching (ELT) policy makers in the context to implement ICT tools in English classes.

**Agrahari A. & Singh, S. (2013).** Technology Based Learning Environment and Achievement of Students in Chemistry at Secondary Level of CBSE and UP Board in India. *Aarhat Multidisciplinary International Education Research Journal (AMIERJ)*. 2(3), 134-147.

The fast growing accessibility and capability of emerging technologies have fashioned enormous possibilities of designing, developing and implementing innovative teaching methods in the classroom. The global technological scenario has paved the way to new pedagogies in teaching-learning process focusing on technology based learning environment and its impact on student achievement. The present experimental study was conducted to determine the effectiveness of technology based learning environment on student achievement in chemistry at secondary level. A pre-test- post-test equivalent group design was used to compare the achievement of the two groups. A Pre-test and A post-test containing 50 items each from Chemistry textbook were developed and administered. The collected data were statistically analyzed. The results showed that there was a significant difference between the mean scores of Experimental group and the Control group. The performance of Experimental group was better on post-test scores that indicted that teaching through technology based learning environment enhanced the achievement

level of the students. On the basis of the results, it was recommended that teaching and learning through information and communication technologies may be adopted to enhance the language learning capability of the students.

**Tak, R. M. (2013).** A Study On Feasibility And Effectiveness Of ICT Integration In Higher Education In Developing Countries With Special Reference To India. *International Journal of Scientific Engineering Research*, 4(2), 4.

Information and communication technology refers to various forms of information and various means of communication used to share information. In present scenario, life cannot be imagined without ICT. Every aspect of life and society is driven by ICT in one or the other way. Education is no exception in this regard. Traditionally, Education refers to a learning process where knowledge is shared among two entities namely, teacher and student. In today's technological environment it is not simply give and take, but ICT has changed the entire scene. Education has been enriched by different means of ICT. The present paper is based on non experimental survey and study on use of ICT in higher education in India. The author tried to explore the ICT usage in education by faculty members of an engineering college. This study will eventually help to understand the feasibility and effectiveness of ICT usage to impart knowledge in such colleges where students come from both urban and rural areas of India. This study will help educators, researchers, and policymakers to establish more reasonable ICT integration practices so as to make education process keep pace with the technological development.

**Kennedy, P. (2013).** ICTs in Urdu Medium Schools in Hyderabad: An Evaluative Study. *American International Journal of Research in Humanities*. 3(4),138-141.

The use of computers in the classroom is creating a minor revolution in how our children learn everyday subjects like science, maths, history and geography. Multisensory attractive multimedia content is entertaining and educating kids. Introduction of K-Yan technology which is high performance machine is facilitating teaching as never seen before. This is a multimedia computer with TV, DVD, CD player, CD writer, LCD projector, internet surfing all rolled into one. Right now lessons from classes V to VIII are loaded into K-Yan, but students from lower classes are also clamoring for it.

**Fathima, S. (2013).** Challenges of ICT in teaching learning process. *International Journal of Engineering and Science*, 2(12), 51-54.

This article stresses on how ICT helps in improving the quality of education stating 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. ICT can change the traditional concept of learning process and the components of ICT should be integrated in the education program me in such a way that teaching should be enabled to face the new demands and improve the efficiency and effectiveness of

education at all levels in both formal and non-formal settings. ICT not only enhances the learning experience of student but also helps them develop the skill essential to participate effectively in the world of affairs. Knowledge of ICT and skills to use ICT has gained immense importance for today's teacher. The new learning environment developed by the ICT is called Interactive Learning Environment. ICT aims at transferring the old traditional paradigm of learning to the new paradigm of learning. Thus, we must accept the new paradigm and technology in teaching learning process. Educational institutions need to develop strategies, plan to improve teaching-learning process and ensure that all teachers are well prepared to use the new tools for learning. The emergence of the knowledge-based society is changing the global status of education .Now; it is the time to develop a new knowledge-based global society. In developing countries like India, there are many untrained teachers in this area. The new ICT would be able to reach these teachers and can provide quality education all around the globe.

**Hussain, A., Khan, M. A., & Zaidi, N. F. (2013).** The ICT based library and information services: a case study of B-Schools in Delhi and NCR region. *Library Philosophy and practice*, 0\_1.

The study investigated the ICT based library and Information services: a case study of B-schools in Delhi and NCR region. The present study demonstrates and elaborates the primary way to learn about ICTs, the purpose of using ICT enabled library services, to assess to what extent users are utilized ICT based library services and facilities, various aspects of Internet usage, favorite search engines, and problems faced by the users in using the ICT in libraries. The papers also determine the satisfaction level of users regarding research work, online database services and infrastructure facilities. Suggestions have been given to make the service more beneficial in the library users of B-schools in Delhi and NCR region.

**Patel, R. C., & Ramesh, M. (2013).** ICT Aided Pedagogy for Generating Scientific Knowledge. *Bi-Monthly e-Journal*. 2(3),11.

Science is a process of searching knowledge in a systematic way. Scientific knowledge is tentative and can be verifiable. Science can teach the students to think in a clear and logical way. The objectives of teaching science especially in school is to construct scientific knowledge, attitude development, nurture the process skills, to study science education at higher level, and sensitize the pupil about application of science and technology. In this contemporary world computer technology penetrating in all fields, science teaching is no exception from that. Students and teachers have high expectation in using computers in their classroom because Information and communication Technology (ICT) make the learning easier, and versatile. ICT aided science teaching and learning can facilitate the teacher to teach the concepts and skills in a most meaningful way. National Knowledge Commission (2006-09) recommends that wherever feasible, ICT should be made more accessible to teachers, students and administration for learning. NCF (2005) also emphasized the use of ICT in teaching learning process. Hence there is a shift is needed from the conventional teaching to constructive learning. ICT aided pedagogy

is one such a constructive approach for learning science among the school children, thus this paper focusing ICT based teaching learning for knowledge generation.

**Devi, L. P., & Bimol, S. (2013).** Integration of ICT in teaching: A new vision for future teacher. *International Journal of Multidisciplinary Management Studies*, 3(5), 38-44.

The world of education is rapidly influenced by fast changing technology and bringing a new challenge in teaching and learning practice. ICT are becoming more and more important in teacher training institute/ College. The new teaching methodologies aimed at more effective and appropriate learning for professional practices involve the use of ICT as an interactive tool of instruction. The use of ICT, Internet, and multimedia are recognized new field in education system. Visual aids and computer aids instructions gain much attention of students' more than verbal teaching and will influence the teaching in the future sphere of dissemination of knowledge and information. Integration of ICT tools in teaching has been at forefront of education sector that enhanced the ability of quality of education in various educational organization and training institutions. This paper presents the theoretical study on the importance of integration of ICT tools in teaching practice and use in teachers' training institution/college on the perspective of future teacher.

**Joshi, N. (2013).** Understanding 21st Century Learners and ICT for Quality Improvement of Teacher Education in India , ICT in Education. *International Electronic Journal*, 1 (1), 20-25.

Some researchers are even suggesting that the neurological wiring of these learners is actually physiologically different from that of their predecessors. If students are to be productive members of the 21st Century workplace, they must move beyond the skills of the 20th Century and master those of the 21st Century. Teachers are entrusted with mastering these skills as well and with modeling these skills in the classroom. The characteristics of the 21st Century classroom will be very different from those of in the classrooms of the past because the focus is on producing students who are highly productive, effective communicators, inventive thinkers, and masters of technology.

**Thapliyal, U. (2013).** Equity in Higher Education: Exploring the Role of ICT. *Educationia Confab*, 2(9), 55-61.

The Indian higher education system today faces a daunting challenge of expansion in the face of globalised competition and all this has in turn made the access to higher education even more difficult. With tertiary education at the disposition of the privileged few, and majority percentage excluded from the educational stream, the prospects of youth getting employment are affected. The job and economic insecurity with unfulfilled career ambitions among the disadvantaged group leads to aimlessness and unrest, fear and frustrations. With its unimaginable scope, ICT has become a buzzword. Techno-pedagogic competencies are being emphasized more than ever before in recent times. "Education for all" being one of the millennium development goals, social

equity at all the levels of education is an imperative. In accordance with the recommendations of NKC, Indian government has launched “National Mission on Education through ICT” in 2009 with main aim of providing high quality personalized and interactive knowledge modules over the Internet for all the learners in higher education institutions in 'Any-time Any-where mode'. Yet another aspect associated with the usage of ICT is “Digital Divide” that makes it rather an instrument that needs an intelligent handling. Thus, implementing ICT in higher education for promoting social equity demands a strong infrastructure, proper planning and policy-making, efficient professionals and reorientation of the higher education framework. This paper intends to explore the transformative potential of ICTs in the field of higher education by studying the ways and means through which ICTs promote social equity.

**Prasadh, R. S. (2013).** Role of Information and Communication Technology in Education. *Current Perspectives on Education*.3, 31-37.

Education in the past was usually a matter of unidirectional transfer of information from the teacher to the student. The main pedagogical approach was whole class teaching. Many argue that new pedagogical models need to be explored in order to prepare future citizens for lifelong learning. There is, as yet, little consensus in societies about what these new pedagogical models should encompass. ICT stands for information and communication technologies. It consists of “diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information.” These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephone. In recent years there has been a groundswell of interest in how computers and the Internet can best be harnessed to improve the efficiency and effectiveness of education at all levels and in both formal and non-formal settings. The present paper discusses the role and importance of Information and Communication Technologies (ICTs) in Education and draws the uses of ICTs and challenges in integrating ICT in Education. Finally, it concludes the necessity of implementation of ICT in educational institutions.

**Suklabaidya, S., & Sen, A. M. (2013).** Challenges and Prospects of E-governance in Education. *International Journal of Emerging Trends & Technology in Computer Science (IJETTCS)*, 2(3), 258-262.

Electronic Governance (e-Governance) is the use of Information and Communication Technologies (ICT) for the planning, implementation, and monitoring of government programs, projects, and activities. E-Governance is expected to help deliver cost-effective and easy-to-access citizen services, and improve processing of transactions both within the government, and between the government and other agencies. The National e-Governance Plan (NeGP) which is the flagship e-governance programme of the Central Government, was approved by the Government of India in May 2006 comprising with 27 Mission Mode Projects(MMPs)at the Central, State and Local Government level. But the number of mission mode projects is going to be 30 which are under process on the cabinet where education sector is one of them. Under the

NeGP, the state 'Mission Mode Projects' are Land Records, Road Transport, Property Registration, Agriculture, Treasuries, Municipalities, Gaon Panchayat, Commercial Taxes, Police, Employment Exchanges, WCD&SW, Cooperation. By inclusion of education in the State level MMPs of NeGP, the concept of effective governance of education sector is thoroughly innovated; for effective handling of new challenges confronting the education sector. Educational e-governance can facilitate in improving transparency, providing speedy information dissemination, improving administrative efficiency and public services in all aspects of the education. It is beyond doubt that for the quantity and quality of output of our education system to substantially improve, there is no option but to introduce e-governance in this sphere. The application of ICT for governance is somewhat poor because of which the NeGP is setup, but it is furthermore poor in the education sector which is one of the key pillars for the rapid growth of economy of the country. The challenge is therefore to bring e-governance into educational sector. This research aims at bringing ICT for e-governance of the education sector.

**Meenakshi (2013)**, Importance of ICT in Education. *IOSR Journal of Research & Method in Education*. 1(4), 3-8.

This paper is a mere attempt to present a glimpse of meaning of ICT, its importance & its mandatory need for education, which is indispensable. ICT stands for Information & Communication Technology. These technologies include: computers, the Internet, Broadcasting technologies (radio and television), Telephony. One of the many challenges facing developing countries today is that of preparing their societies and governments for globalization and the information and communication revolution. Policy-makers, educationists, non-governmental organizations, academics, and ordinary citizens are increasingly concerned with the need to make their societies competitive in the emergent information economy. Globalization and innovations in technology have led to an increased use of ICTs in all sectors - and education is no exception. Uses of ICTs in education are widespread and are continually growing worldwide. It is generally believed that ICTs can empower teachers and learners, making significant contributions to learning and achievement. Of the teachers interviewed on the effectiveness of ICT in education majority of them felt that introduction and use of ICT adequately will be extremely effective in children's learning and achievement. However, current research on the impacts of ICTs on student achievement yields few conclusive statements, pros or con, about the use of ICTs in education. Studies have shown that even in the most advanced schools in industrialized countries, ICTs are generally not considered central to the teaching and learning process. However, there appears to be a mismatch between methods used to measure effects and the type of learning promoted. Standardized testing, for example, tends to measure the results of traditional teaching practices, rather than new knowledge and skills related to the use of ICTs. It is clear that more research needs to be conducted to understand the complex links between ICTs, learning, and achievement. Again, on the question of impact of audio visuals, research shows that surprisingly little documentation is available on the use and impact of video in education, barring one or two video projects like UNICEF's animation series, Meena, which has become a key weapon in the battle against gender and social inequity in South Asia. Many teachers are

reluctant to use ICTs, especially computers and the internet. Some of the reasons for this reluctance include poor software design, skepticism about the effectiveness of computers in improving learning outcomes, lack of administrative support, increased time and effort needed to learn the technology and how to use it for teaching, and the fear of losing their authority in the classroom as it becomes more learner-centered. In terms of using internet and other ICT as a resource for lesson preparation, most of the teachers interviewed, admitted to never or rarely using it, while very few used the internet to gather information sporadically or regularly.

**Noor-Ul-Amin, S. (2013).** An effective use of ICT for education and learning by drawing on worldwide knowledge, research, and experience: ICT as a change agent for education. *Scholarly Journal of Education*, 2(4), 38-45.

Information and communication technologies (ICT) have become commonplace entities in all aspects of life. Across the past twenty years the use of ICT has fundamentally changed the practices and procedures of nearly all forms of endeavour within business and governance. Education is a very socially oriented activity and quality education has traditionally been associated with strong teachers having high degrees of personal contact with learners. The use of ICT in education lends itself to more student-centered learning settings. But with the world moving rapidly into digital media and information, the role of ICT in education is becoming more and more important and this importance will continue to grow and develop in the 21st century. In this paper, a literature review regarding the use of ICTs in education was provided. Effective use of ICT for Education, along with ICT use in the teaching learning process; quality and accessibility of education; learning motivation. Learning environment. Besides, an overview of the ICT and scholastic performance.

**Singh U., (2013)** Technology Integration In Teacher Education: An Infusion or A Delusion?, *Journal of Arts, Science & Commerce* , 4(3), 147.

The present study attempts to find out the state of technology integration in those teacher education institutions and schools of Patna in the State of Bihar, India that have the state of the art technology status. Sample of 150 pre-service and 64 in-service teachers was drawn for this purpose by purposive cum incidental sampling technique. The researcher studied the availability and accessibility of technology in the selected schools and teacher education institutions; the relationship between technology proficiency of pre-service and in-service teachers and their attitude towards integrating technology in education; and the relationship between frequency of faculty usage of technology in classroom instruction and attitude of pre-service teachers towards technology integration. Research outcomes showed that teacher education institutions are making efforts to use technology in teaching-learning while schools still follow the traditional method. However, the situation is far from attaining technology integration in educational practices. There is significant relationship between proficiency of in-service teachers and their attitude towards technology integration and between frequency of faculty usage of technology in classroom instruction and the attitude of pre-service teachers towards technology integration.



**Rajsekhar, K. (2013).** The role of information and communication technology (ICT) in teacher education in India: A study. *Asian Journal of Research in Social Sciences and Humanities*, 3(6), 168-178.

Present educational systems are pressure to use the new information and communication technologies (ICTs) in teacher education, because the students need up-to-date knowledge and skills for their development or to develop them. ICTs predict the transformation of the teaching-learning process and the way teachers and learners gain access to knowledge and information. But, the challenge confronting our educational system is how to transform the curriculum and teaching-learning process to provide students with the skills. There are several systemic concerns and needs that need to be addressed in this exercise of redesigning the curriculum framework for teacher education. Existing programs of teacher education treat knowledge, embedded in the prescribed school/college curriculum, as a 'given' and teachers do not engage enough with the curriculum framework. Therefore teachers must learn to adjust to existing realities. The present paper is based on the secondary sources and study the need and active role of ICTs in teacher education in India.

**Agrawal, A., & Prasad, P. (2013).** Skill Development Education Through ICT (ODL). *Journal of open schooling*, 62(2), 38-43.

All education today is marked by a rapid increase in the use of technology across levels, setting and modes. Be it primary, secondary, higher or technical education; lifelong learning or skill development, in formal or non-formal contexts and indeed whether in a face-to-face setting or in an open and distance learning (ODL) mode, technology informs all aspects. If you see the correct scenario you will find that there is a flood of advanced technology all over the globe but our education system is not benefiting due to the lack of information and knowledge of student, teacher, organization and the administration. The 21st century is the century of IT revolution. To meet the challenges of time ICT are a major factor in shaping the new global economy and producing rapid changes in society. Computer ETV, internet, E-mail, print and electronic media, digital devices, FM Radio etc. E-Learning is naturally suited to instant learning and flexible learning. In a highly competitive, multicultural workplace, integrated skills and personal qualities are in great demand. Technical innovations have altered the way work is performed and new management processes have changed the way people perform it.

**Padmavathi, M. A. (2013).** Survey of secondary school teachers' perceptions, competency and use of computers. *International Journal of Education and Psychological Research (IJEPR)*, 2(4), 7-16.

Use of ICT for teaching and learning has received a lot of attention in the last two decades. The present study is an attempt to understand the use of ICT, more specifically, use of computers among secondary school teachers for teaching and learning. The main focus of the study is to elucidate teachers' perceptions and competency in relation to actual use computers in classroom teaching. The study was carried out among secondary school teachers working in Puducherry,

India. Teachers' perception towards use of computer was found to be favorable. Age, gender, training in computers, teaching subject did not show significant difference in the teachers' perception on use of computers. However, the actual use of computer by teachers seems to differ significantly by age, gender, computer ownership, teaching subject, teachers' competency, and training. It is concluded that home access to computers, skill training and competency of teachers are the main determinants of integration of ICT in school education.

**Singh, M. (2013).** An Analytical Study on Current Level of ICT Access and Its Use in Education Sector: A Wake up Call for Educational Institutions. *International Journal of Innovative Research and Development*, 2(12), 89-95.

Education is an asset for a society. The education system in India is governed by the Ministry of Human Resource Development (MHRD), and the different Departments of Education at the state level. The government of India has been making various noteworthy advancements in achieving the goals of universalization of elementary education through (ICT). This research work is an attempt to generate awareness among both in teaching and student fraternity employed/ enrolled in an educational institution. This is a secondary research on various policies of ICT run by government of India and by state governments to facilitate virtual teaching, online classes, content development and its delivery and connecting students from remote areas, rural areas along with urban regions. Some of the popular schemes are Sarva Shiksha Abhiyan(SSA), Kendriya Vidyalaya Sangathan( KVS) or Central Schools, Navodaya Vidhayalaya Samiti(NVS), Rashtriya Madhyamik Shiksha Abhiyan, and EDUSAT etc. This research highlights the spectrum of experiences of various schemes launched by government of India and by state government, for school education. It will also include the advantages and some practical hurdles of implementing ICT at primary, secondary and senior secondary school education.

**Shivakumar G.S. and T. Manichander (2013).** Restructuring the Future Classroom - A Global Perspective. *i-manager's Journal on School Educational Technology*, 9(2), 19 - 24.

The students are the consumers as well as co-creators of knowledge. Information does not flow top-down any more. Networks, peers and students inquisitiveness teach students. Teachers act as filters. Collaboration is the key. In today's world for the netgen, knowingly or unknowingly technology and the free flow of information via internet has made young mind wanting. Over the last few decades, everything has changed in our lives with the all pervasive intervention of technology. However classrooms have remained untouched by technology. The classrooms that our grandparents went to are exactly the kind of classrooms our children study in. Chalk and blackboard, a packed classroom, text books, regimented curriculum, a teacher painstakingly explaining abstract concepts with the limited tools at her disposal. Imagine a Science teacher explaining how a DNA replicates, a History teacher teaching a class about the Harappan Civilization, or a Geography teacher teaching how Block mountains are formed.

**Hashemi, B. (2013).** The investigation of factors affecting the adoption of ICTs among English language Teachers in ESL context. *International Journal of Language Learning and Applied Linguistics World*, 58(8), 90-109.

As language and technology are two major focuses of reform in education, teachers of English language have to cope with the challenge of technological and pedagogical shifts occurring in the teaching profession. The purpose of the present study is to investigate the factors affecting the adoption of Information and Communication Technology (ICT) among English teachers in an English as a Secondary Language (ESL) context by means of a quantitative study. First, using a validated and reliable questionnaire consolidated and inspired by other researches done in the field, the researcher elicited the point of view of 217 English teachers about the mentioned factors. The data collected from the questionnaire was entered into SPSS software for further analysis. One sample t-test, multiple regression, independent sample t-test and ANOVA were used for analysis and testing of the hypotheses. The results demonstrated that three factors proposed by the researcher were confirmed as active on the adoption of ICTs among teachers. The priority of the factors based on their views was: perceived usefulness, ICT knowledge to use and support language teaching and learning, respectively. Furthermore, the researcher found that there was no difference between the means in relation to the male subjects and female subjects attitude towards the factors affecting ICT adoption. Also, the training courses in ICT taken by the respondents did not affect their total attitude towards the factors affecting ICT adoption. Finally, based on the findings of the study and other reviewed guidelines, the researcher proposed some useful suggestions for English teachers and English Language Teaching (ELT) policy makers in the context to implement ICT tools in English classes.

**Rastogi, A. & Malhotra, S. (2013).** ICT Skills and Attitude as Determinants of ICT Pedagogy Integration. *European Academic Research*, 1(3), 87-91.

In a developing country like India, the mismatch between the techno-centric culture mindedness and the teachers' pedagogic culture results in the alienation of the teacher from the use of technology. The present paper focuses on examining teachers' attitude towards ICT; level of their competence in ICT skills; their experiences with ICT; and how best they use ICT in their current educational practice. Maybe due to the overwhelming strength of different types and levels of ICT skills and attitudes possessed by teachers or due to their staunch commitment to various pedagogical inputs in the teaching-learning process, it is likely that the actual integration of ICT in pedagogy might not take place, both strengths hanging loose by themselves. This study tries to explore how the proficiency in ICT skills and attitude towards technology can help in ICT-pedagogy integration. It reveals a strong positive relationship between the possession of ICT skills by teachers, their attitude towards ICT and actual implementation of ICT in their classroom teaching.

**Kargiban, Z. A., & Kaffash, H. R. (2012).** ICT Curriculum in Secondary School: A Comparison of Information and Communication Technology in the Curriculum among England,

America, Canada, China, India, and Malaysia. *International Journal of Computer Application*, 1(2), 77-99.

In this article, the ICT curriculum of the secondary schools in some developed and developing countries that use ICT in education is described and the framework of ICT use in these countries are proposed. This framework describes ICT use in teaching- learning process. According to the framework, this paper discusses features of use of ICT in education which will be useful to instructional designers to integrate ICT into school curriculum in our country. In this phase the study of the current ICT curriculum of the secondary schools in the developed and developing countries (England, America, Canada, China, India, and Malaysia) was performed. Library study was utilized in this phase. This study aimed:

1. To describe the ICT in the curriculum structure and teaching-learning strategy based on the experiences of the six mentioned countries.
2. To analyze the ICT experiences in relation to the curriculum and to highlight the best practices. With the advent of the ICT revolution, India and its villages are slowly but steadily getting connected to the cities of the nation and the world beyond. The government, the corporate sector, NGOs and educational institutions has supported the rural development by encouraging digital libraries, e-business and e-learning. India has a rich cultural heritage, dating back many centuries. Having missed out the industrial revolution, India is now slowly inching towards a super-power status in the era of knowledge revolution (Khaiser Nikam, Ganesh, and Tamizhchelvan 2004). ICT now plays an important role in the curriculum of England, Malaysia, America, Canada, India, and China. However, ICT as a subject discipline in Malaysia and China is more or less different compared to its characteristics in the National Curriculum for England, America, India, and Canada. The curriculum of China and Malaysia is formed in a behaviorist way while that of England, America, India, and Canada are based on constructivist theory.

**P.K. Chaurasia (2012).** ICT Kit in Mathematics. *Journal of Indian education NCERT*. 37(4), 49-67.

The role of ICT in the mathematics curriculum is much more than simply a passing trend and it is envisaged not simply as a technical skill or as a means of improving learning effectiveness but also as a way of transforming the goals and processes of education. It provides a real opportunity for teachers of all stages and subjects to rethink fundamental pedagogical issues alongside the approaches to learning that students need to apply in classrooms. Innovations that require teachers to change many aspects of their daily routines are very demanding for them. Complex innovations can only be successful if a number of interacting conditions are met. This paper describes a design for an ICT based tool which can be fitted in mathematics teachers' daily routine easily. Though every teacher has her own style, this paper provides a comprehensive technology exposure along with how to design digital content resources using open source mathematical software with the pedagogical approaches and an evaluation mechanism through ICT. This ICT Kit in mathematics describes a design of a source for teacher's professional

development in mathematics as well as rubrics based continuous and comprehensive evaluation tool.

**Paul P.K. and Mondal N.K. (2012)**, Integration of ICT in School Education: An Analytical Study in Burdwan District in West Bengal, India. *Research Journal of Management Sciences*, 1(4), 21-25

This paper attempts to analyze the role and performance of Information and Communication Technology (ICT) in enhancing quality of school education in Burdwan district in West Bengal. The study covers 65 senior secondary schools encompassing 100 respondents of West Bengal. It has proven that adoption of ICT as a strategic management tool is a welcome sign for all the surveyed schools. The study result indicates that ICT was successful in predicting the future of new technology for the purpose of teaching-learning and transaction of curriculum and thereby enhancing quality of education. The 'Kendell's Coefficient of Concordance' shows a significant association between ICT and quality of education. The study result revealed a close association among the factors like 'relative advantage' of ICT and quality of education. It is interesting to note that no gender disparity exists of effects of ICT on quality of education. However, the magnitude of quality of education lies in its ability to organize ICT through establishment of proper infrastructure in the school. This study also showed how ICT has received extensive recognition as a strategy for upgradation of quality of education through acquired relative advantage, compatibility, demonstrability and image by overcoming the factors avoidance and complexities of new technology (ICT)

**Gupta, C., D. and Haridas, KPN (2012)**. Working Paper, International Growth Centre.

Computer Aided Learning (CAL) in school and has been recognized for these efforts through the Manthan South Asia award for e-governance for the year 2010 under thee -education category for its project "Implementation of computer aided learning in 244 schools in Bihar under the BEP-India". The literature on use of ICT for pedagogy has set out certain benchmarks for integration of ICT into the learning process as a way to improve the quality of school education in specific social contexts. The objective of this study is to bring out the role of ICT in improving the quality of school education integrated within pedagogical approaches taking on board the social constraints of schooling in Bihar and comparing it with the documented results of similar initiatives, experiences and impact in other parts of India. Government of Bihar has also announced a shift in the focus of its current IT policy to Information and Communication Technology (ICT). This study will provide inputs to the education component of ICT policy and school education policy of Government of Bihar on possible ways to create and improve the learning environment in schools in Bihar.

**Suryawanshi, K., & Narkhede, S. (2012)**. Green ICT implementation at professional education institutions: A study from Indian context. *International Journal of Advanced Research in Computer Science and Electronics Engineering (IJARCSEE)*, 1(8), 111-114.

The future of the nation, the youths are in colleges, now. The India became the future IT hub for the world as per experts. This study covers the sustenance of ICT for preserving energy for this

technology and along with preventing mother Earth from hazardous carbon emissions which is major cause of global warming. The paper outlines the policies of Indian government towards green ICT. The study identifies the need of eco sustainable or green ICT implementation at professional education institutes and also identifies the green parameters for information and communication technology. The objective of the study was to simply raise awareness of Green ICT implementation need at professional education institutes. In the present work, the authors tried to make a systematic study on the issues of ICT use in education and also to find three significant reasons namely the social, economic and environmental demands of green ICT.

**Ahmad, W., Kumar P., Nehra D. K. and Kumar V. (2012).** Emergence of Information Communication Technology in Management of Children with Special Needs. *Delhi Psychiatry Journal*, 15 (1), 225-230.

Today we are in the era of inclusion. In almost every country, inclusive education has emerged as one of the most the dominant issues in the education of students with special education needs (SWSEN). In the past 40 years, the field of special needs education has moved from a segregation paradigm through integration to a point where inclusion is central to contemporary discourse. Inclusive education is a strategy based on human rights and democratic principles that confronts all forms of discrimination. Inclusive education is concerned with removing all barriers to learning, and with the participation of all learners vulnerable to exclusion and marginalization. It is a strategic approach designed to facilitate learning success for all children. Hence, it becomes the duty of a regular teacher to handle children with special needs along with normal children in his/her classroom. So the ICT that he uses should also meet the diverse needs of children with disabilities such as children with learning disabilities, mild intellectual disability, autism, hearing impairment and visual impairment. As states and schools work to implement the requirements of educational reform required by the No Child Left Behind Act, 2001, they must ensure that all students are included, in particular students with disabilities. Specifically, technology assists students with disabilities to: (a) maximize independence in academic and employment tasks; (b) participate in classroom discussion; (c) gain access to peers, mentors, and role models; (d) self-advocate; (e) gain access to the full range of educational options; (f) participate in experiences not otherwise possible; (g) succeed in work-based learning experiences; (h) secure high levels of independent learning; (i) prepare for transitions to college and careers; (j) work side-by-side with peers; (k) master academic tasks that they cannot accomplish otherwise; (l) enter high-tech career fields; and (m) participate in community and recreational activities<sup>4</sup>. The view of technology as playing a “role” for the student with disabilities includes a focus on the teacher’s integration of technology into the learning environment and on technology’s impact on student outcomes and related benefits.

**Nishta Rana (2012).** A Study To Assess Teacher Educators Attitudes Towards Technology Integration in Classrooms. *MIER Journal of Educational Studies, Trends & Practices* , 2(2),190-205.

The aim of this study was to assess the teacher educators' attitudes towards technology integration in classrooms. 21 teacher educators from a teacher education college of north India participated in this study. The data were collected with the help of a Teacher Educators' Attitude towards ICT Scale containing forty items. The results show that most of the teacher educators have positive attitudes towards the general role that information and communication technology can play in education and in the educational process. The findings also reveal that no gender differences exist on attitudes towards ICT in teacher training. Further analysis shed light on differences in attitudes with respect to age.

**Devi, S., Rizwaan, M., & Chander, S. (2012).** ICT for Quality of Education in India. *International Journal of Physical and Social Sciences*, 2(6), 542-554.

Information and Communication Technology (ICT) can be utilized for the education sector. Education includes online, distance and part time education. There are unlimited applications of ICT in the real world. In his paper emphasis is on the education field. Traditional Non-formal education system process includes activities like admission, Personal Contact Programmes, Exam for any course in a University or Institution. In this process ICT can play a great role in all the activities by providing a lot of benefits to students, teachers, parents and Universities itself. ICT can be used for providing education to the people who are not able to come to school due to various constraints. ICT can play great role in formal and non formal forms of education. The paper examines certain important issues related with the effective implementation of ICTs in all levels of education and provides suggestions to address certain challenges that would help in the implementation of ICTs in education and simultaneously increasing Quality of education.

**Sulaiman V, R., Hall, A., Kalaivani, N. J., Dorai, K., & Reddy, T. V. (2012).** Necessary, but not sufficient: Critiquing the role of information and communication technology in putting knowledge into use. *The Journal of Agricultural Education and Extension*, 18(4), 331-346.

This is the first of two linked papers dealing with information and computing technology (ICTs) and the question of putting research into use. This, the first paper, takes the experience of South Asia to review the scope of ICT applications in development practice as a tool for putting research into use for innovation. The findings from this study suggest that ICTs in general have not contributed effectively to the challenge of putting new knowledge into use as they are mostly used to support traditional communication tasks — such as information dissemination and training. The paper argues that this under-utilization of the potential of ICTs could be due to: a lack of appreciation of the new communication- intermediation tasks required for innovation, underestimation of the roles of intermediaries and their capacities for innovation and lack of networks needed for communities to make use of the information provided through ICTs. Although the understanding on communication, innovation and extension has changed

substantially in the past two decades, there is still a big gap between theory and practice. This paper contends that this gap needs to be bridged if ICTs are to effectively contribute to putting new knowledge into Use.

**Sarkar, S. (2012).** The role of information and communication technology (ICT) in higher education for the 21st century. *The Science Probe*, 1(1), 30-40.

This paper attempts to highlight the role of ICT in higher education for the 21st century. In particular the paper has argued that ICTs have impacted on educational practice in education to date in quite small ways but that the impact will grow considerably in years to come and that ICT will become a strong agent for change among many educational practices. It is evident from the study that use of ICT in education is increasing very rapidly in various states of India. One of the most common problems of using Information and Communication Technologies (ICTs) in education is to base choices on technological possibilities rather than educational needs. In developing countries where higher education is fraught with serious challenges at multiple levels, there is increasing pressure to ensure that technological possibilities are viewed in the context of educational needs. The use of ICT in education lends itself to more student-centred learning settings and often this creates some tensions for some teachers and students. But with the world moving rapidly into digital media and information, the role of ICT in education is becoming more and more important and this importance will continue to grow and develop in the 21st century. Thus, the paper suggests that ICT in higher education is not a technique for educational development but also a way of socio-economic development of the nation.

**Utpal M. (2012).** Impact of ICT on Schooling: The Starry-Night Effect, Newsletter of the International Federation for Information Processing Working Group 9.4 and Centre for Electronic Governance, Indian Institute of Management, Ahmedabad

Clear objectives of ICT in schools stated in the National or State policy and a strategy to translate these into curriculum, pedagogy, assessment and teacher training can create a climate conducive to the use of ICT in schools. The effects of the technology on teaching-learning can then be clearly assessed. But not many ICT programmes in India and many other countries operate in this climate. If news reports(Chitlangia, 2011) are indicators to go by, there are no teachers for computer classes in government schools in the country's capital for the past several years. No teacher, no time, no programme, and no place for computers in the school - the picture is more pathetic in the rest of India 25 years after the introduction of computers in schools. Meanwhile, there are reports galore that record the more successful aspects of ICT programmes ignoring the ones that are not so. Such reports create the starry-night effect – spectacular but illusory.

**Joshi, M., & Toro, U. (2012).** ICT in Higher Education: Review of Literature from the Period 2004-2011. *International Journal of Innovation, Management and Technology*, 3(1), 20.



Information and Communication Technology (ICT) is a vehicle to enhance the quality of the education. As the world is moving rapidly into digital media and information, the role of ICT in education is becoming more important in the 21st century. ICT helps to share availability of best practices and best course material in education. ICT based education causes changes in the educational objectives in the conception of the teaching and learning process. ICT allows the academic Institutions to reach disadvantaged groups and new international educational markets. Within the past decade, the new ICT tools have fundamentally produced significant transformations in industry, agriculture, medicine, business, engineering and other fields. The new teaching methodologies involve the use of audiovisual, computer and telematic tools on the part of lecturer.

**Beena, M., & Mathur, M. (2012).** Role of ICT education for women empowerment. *International Journal of Economics and Research*, 3(3), 164-172.

Education is the most powerful weapon which you can use to change the world. Information and communications are closely linked to power and the ability to affect change. ICT is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer etc. Socially the majorities of Indian women are still tradition bound and are in disadvantageous position. ICTs are emerging as a powerful tool for women empowerment in a developing country like India. The sample size of the research was 200 by no. of trainees and 30 by no of instructors of different Governmental and Nongovernmental Organizations of Jaipur district. Researcher used random sampling technique to select the sample for the study. The data was collected with the help of self constructed questionnaire. The analysis of mean and graphical representation used for the analysis of data indicated that the Age group, Marital status, Educational level had significant effect on different variable of women empowerment like Self confidence, Self awareness, Independence and Feeling of freedom. The study can be used to create awareness among women for betterment of their live. This research concluded that the information and communication technology empower a women in various areas like social, educational, personal, psychological, political, technological and economical.

**Roy, N. K. (2012).** ICT-enabled rural education in India. *International journal of information and education technology*, 2(5), 525.

Right to Education is the primary right of every citizen of India, whether a child resides in a high profile society or in a far away not so developed secluded village, according to the Article 45 of Indian Constitution the basic elementary education must be provided to all the children up to the age of fourteen years. Even after 64 years of independence some States in India are still struggling to achieve Universal enrolment, retention and quality education. There are about 1303996 or more than one million rural schools among 6,38,000 villages in India. Schools in rural areas are promoted to raise the level of education and literacy in rural India. The main aim of running these types of schools in India is to increase the rate of literacy in rural areas. More than 40 percent of India's population is illiterate and cannot read or write. Schools in rural areas

are inadequate and often equivalent to being non-existent. Thus, government's initiative to set up schools in rural areas came into picture. According to Just Indian Schools the conditions of rural education in India, is improving steadily and the government is also providing full support and providing with many initiatives. The fee structure in these schools is also very low so that every child can study and afford it.

**Bose, S. (2011).** ICT, Instructions and reforms: Case study of four educational institutions. *Malaysian Journal of Educational Technology*, 11(1), 45-54.

The increasing dependence on Information and Communication Technology (ICT) and globalization are intertwined trends. Together, they are integrating societies and homogenizing cultures. Consequently educational systems of different societies are aspiring for similar practices and attainments. One such aspiration is to integrate ICT into the instructional system. This aspiration is based on the argument that ICT can reform instructional practices. The descriptive case study undertaken aimed to critically assess the nature of ICT use in the classrooms of four educational institutions of India - a government and a private senior secondary school, a coaching center and a nursery school and determine whether the emerging pattern of ICT use could lead to instructional reforms. Interpretation of information was done by anchoring it into a rubric developed with arguments in favor of ICT use for delivering instructions and frameworks for technology integration in instructional processes extrapolated from published literature. It was found that although in keeping with the global trend, ICT had been introduced into classrooms but the nature of ICT use in none of the institutions could usher reforms in instructional practices.

**B. Tamil Selvi and S. Thangarajathi (2011).** Development and Validation of Yoga Video Package and Its Effectiveness On Depression, Anxiety And Stress Of School Teachers. *i-manager's Journal on School Educational Technology*, 7(1), 48-56.

Teaching once was considered as a noble job but, within the last decade it has become an increasingly stressful profession for school teachers. Increased work load, insufficient salary package, fast changing curriculum, increase in the responsibilities of the students, modern fast mechanical life, conflicts with the colleagues and with higher authorities have made the teaching profession more stressful. This stress ultimately gives rise to many other psychological problems like depression, anxiety, etc. A lot of physiological problems like changes in blood pressure, hypertension, obesity, diabetes, heart problems, respiratory problems, eating disorders, sleep disorders, etc. arise as a result of job stress. This will finally affect their work efficiency and they also tend to pour down these effects on the school children. It also leads to miserable classroom environment, thereby affecting the learning process of the children. The long search for a natural healing remedy for psychological problems like Depression, Anxiety and Stress finally lead to a scientifically proven technology called yoga. Yoga is a science that has been practiced for thousands of years and is said to be a magical natural remedy for all psychological maladies. So an attempt has been made in this study to use this Yogic Technology, on school teachers. A special video package has been designed based on the above said psychological problems of

school teachers and it is tested on them. A significant reduction in Depression, Anxiety and Stress was found in school teachers after yoga training. So it is suggested to include a short Yoga training for future school teachers which will help them manage their psychological problems and improve their Professional Excellence.

**Bhati, M.S., Bhati, A.K. & Kulvia, K.K. (2011).** Role of ICT in teaching social studies. *Indian Streams Research Journals*. 1(5), 14-20.

In a democratic society like ours, education is an absolute necessity. In a nation, where any voter is may hold any public office-including that of the president-a common man educational programme for the masses is very essential. It is more than a matter of individual and personal choice. It is a v concern of society as a whole. Or schools are, therefore, expected contribute directly to the development of good citizenship, loyalty to democracy, civic responsibility and human relationship. Moreover in the present-day complex world, they are expected to help boys and girls to learn to live effectively, as preparation for useful and well-adjusted lives in the twenty-first century. It means that our schools should help them to acquire a philosophy of life, attitude, skills, concepts, understandings and knowledge that will prove useful to them for the next sixty or seventy years of their lives. These represent the broader goals of our education. And social studies as an independent field of study, has assumed a special responsibility towards the attainment of these goals.

**Kumar, L. and Chin, K., L. (2011).** Impact Of Simulations On The Mental Models Of Students In The Online Learning Of Science Concepts. *i-manager's Journal on School Educational Technology*, 7(2),1-12.

Numerous flash or java applet based simulations have been developed to improve students' comprehension of Science concepts, particularly the more complex or 'dry' ones. Simulations have been reported to be effective as instructional aids in scaffolding scientific learning by students since simulations support the explication of implicit understandings. Simulations are usually designed to allow students to actively manipulate variables to experimentally explore the relationships between these variables and their scientific applications. Rich associative thinking skills can also be infused in students by encouraging them to actively manipulate the simulations and learn on their own new science concepts without being prescriptively taught to by teachers as it often happens in Science classrooms. Misconceptions in the learning of Science concepts can more easily be identified and corrected in a timely manner. This paper examines in-depth research studies that have been conducted on the effectiveness of integrating simulations in the teaching and learning of Science and the effects of simulations in developing sound understanding of Science precepts. Studies done by one of the author of this paper have also been described in explaining the performance of a group of in-service teachers in the applied use of simulations in the delivery of Science education.

**Sansanwal, D. N. (2011).** Use of ICT in Teaching–Learning & Evaluation. International Conference on e-resources in higher education: Issues, Developments, Opportunities and Challenges, 19th & 20th Feb. 2010, Bharathidasan University, Tiruchirappalli

Research evidence has suggested that not a single teacher is capable of giving up to date and complete information in his own subject. The ICT can fill this gap because it can provide access to different sources of information. It will provide correct information as comprehensive as possible in different formats with different examples.

**Awan, R. N. (2011).** What Happens to Teachers ICT Attitudes and Classroom ICT Use when Teachers are made to Play Computer Games?. *International Journal of Information and Education Technology*, 1(4), 354.

The aim of this research was to investigate how the ‘level’ of ICT uptake amongst teachers and the ‘quality’ of ICT use in classrooms can be promoted by challenging teachers’ attitudes towards technology adoption. The issue of teachers ‘technology confidence’ and ICT lesson planning skills were tackled by providing training sessions that focused on encouraging them to use educational multimedia game resources for teaching and learning purposes. The results of this study revealed a positive shift in teachers’ attitudes towards the received ICT training and positive attitudes towards the use of ICT in teaching. To encourage greater ICT use by teachers it is suggested that educational game playing workshops (that are aligned to curriculum outcomes) be considered as a form of sustainable in-service training.

**Rathore, B. (2011).** Language learning through ICT. *Journal of Technology for ELT*, 7(2).

Information and Communication Technology is the buzz word of the 21st century. With incredible finesse it has changed the nature of sharing, storage and dissemination of information. According to UNESCO, “ICT is a scientific, technological and engineering discipline and management technique used in handling information, its application and association with social, economical and cultural matters.” The present paper deals with the importance of ICT in teaching language skills.

**Yadav K. and Sain S. (2011).** The Future of ICT Integration in Teacher Education in India. *Indian Journal of Adult Education*, 72(4) 67-74.

Information & Communication Technology (ICT) is universally acknowledged as an important catalyst for social transformation and national progress. However, disparities in the levels of ICT readiness and use could translate into disparities in level of productivities which would influence a country’s rate of economic growth. Understanding and leveraging ICT is therefore critical for countries striving for continued social and economic progress. The article discusses about National Policies in Context of Teacher Education, Structure of present teacher training process, A Framework for ICTs in Teacher Education, Evaluation in Teacher Education including role of NCERT and RIE (Initiatives and Collaborative activities).

**Sharma, A., Gandhar, K., Sharma, S., & Seema, S. (2011).** Role of ICT in the Process of Teaching and Learning. *Journal of Education and Practice*, 2(5), 1-6.

ICT enables self-paced learning through various tools such as assignment, computer etc as a result of this the teaching learning enterprise has become more productive and meaningful. ICT helps facilitate the transaction between producers and users by keeping the students updated and enhancing teachers capacity and ability fostering a live contact between the teacher and the student through e-mail, chalk session, e-learning, web-based learning including internet, intranet, extranet, CD-ROM, TV audio-videotape. Edusat technology has become very powerful media for interactive participation of experts and learners and it reaches the unreachable. Emerging learning Technology (ELT) of blogging, Integrated Learning Modules, a podcast, Wikis, Enhancement of Browsers, e-learning, M-learning, U-learning have started making rapid strides in teaching learning processes.

**Das, A. K. (2011).** Emergence of open educational resources (OER) in India and its impact on lifelong learning. *Library Hi Tech News*, 28(5), 10-15.

Purpose – The purpose of this paper is to critically examine the evolution of open educational resources OER initiatives in India – how OER movement emerges from the open access movement in the backdrop of an emerging knowledge-based economy. This paper also illustrates how OER help in democratizing lifelong learning spaces that eventually help in skills development. Design/methodology/approach – This paper primarily uses baseline surveys and recommendations of different working groups of Indian National Knowledge Commission. Relevant policy instruments of the Ministry of Human Resources Development, UNESCO, International Federation of Library Associations and Institutions and other national and international bodies are also critically examined to understand India's stand on OER in comparison with other promising developing countries. This paper analyses impact of OER on Indian systems of education, ranging from lifelong learning, technical and vocational education and training to higher education systems. This paper also illustrates various models of innovations which are shaping up multi-dimensional lifelong learning pathways to cater to career aspirations of young Indians. Findings – This paper finds out that Indian OER initiatives make use of textual platforms as well as audio-visual platforms embracing YouTube, Metacafe and other web-based streaming video channels. This paper also illustrates the collaboration patterns in OER initiatives in order to attain sustainability, optimum usage and integration with formal curriculum of skills development programmes. Research limitations/implications – Although this paper identifies external as well as internal factors that are shaping up OER movement in this emerging knowledge economy, this paper mainly focuses on country-level initiatives. The challenges faced at the institutional level as well as users level can be traced through advanced research studies. Practical implications – This paper suggests some sustainable models for OER deployment, lessons learned and challenges faced by practitioners and users communities. Social implications – OER development has become a social movement. Proper deployment and utilization of OER resources will lead to social empowerment of young adults. This paper helps in understanding how Indian society embraces OER in order to attain social justice and empowerment through sustainable educational development. Originality/value – This paper is a

unique attempt to produce a state-of-the-art report on the emergence of the OER movement in a transitional emerging economy.

**Arora D., Quraishi S. & Quraishi (2011),** Role Of Information And Communication Technology in Teacher's Education. *Pioneer Journal*, 3(1), 77-89

The use of Information and Communication Technologies or (ICT), in academic field is a major point of discussion. Where educators and educational researchers are continuously working for innovative ways of using these technologies to support and enhance student outcomes in education. Use of ICT in education and teaching provide number of benefits, but to avail the facilities of ICT teachers need to have certain level of confidence. They should be prepared to use ICT in teaching and also trained in how to integrate ICT with teaching. The main purpose of this paper is to shows the gap between the ICT curriculum used in various universities to train teachers with what is expected from the international standards, national ICT in education policy and the development of the field of ICT itself. This paper also serves those of the challenges and issues faced by teacher educators in preparing and using ICT training curriculum for the next generation of teachers in the face of rising globalization.

**Avdhesh S. Jha (2011).** Teacher Empowerment and Institutional Effectiveness In Teacher Education. *i-manager's Journal on School Educational Technology*, 6(3),49-56.

Teacher Empowerment means to equip a teacher for conceptual and practical teaching which focuses on the relevant syllabus topics. It means the power of the teacher to exercise his judgement of what, why, how, when and why to teach. It also insists on developing a harmonious relationship with the environment along with the right of the teacher to participate in the determination of educational goals and policies and the achievement of educational school goals. In the present study teacher empowerment means the teachers ability and potential to achieve the school goals and the educational goals. The present study is restricted to the B.Ed. trainee teachers of Ahmedabad district. The objectives of the study comprised to know the necessary general qualities, personal qualities, teaching qualities, student teacher relationship, behaviour, attitude and miscellaneous qualities required by a teacher in the classroom and amongst the students for teacher empowerment. 100 trainee teachers from ten different colleges were selected by purposive sampling from Ahmedabad district. A questionnaire was prepared and the survey method was used in the study. The raw data was then grouped and then the frequency and the percentage of the frequency of the responses by the respondents for the said factor necessary for the teacher was applied to do the analysis and interpretation of the data. The study concluded that the necessary qualities required for teacher empowerment is the minimum necessary qualifications required for a teacher, general awareness, good and clear voice, simplicity, nobility, kindness, gentleness, generosity, activeness, honesty, humbleness, politeness, mildness, softness, intelligence, creativity, knowledge of psychology, philosophy, technology, management, different methods, techniques, approach, content, various languages, presentation style, sense of humour, decency and humbleness. The other qualities required by a teacher are responsibility, course completion on

time, duty oriented, unbiased, ideal and intimate in addition to bearing sympathy, mercy, spontaneity and good understanding. The teacher should avoid punishing, frowning, hatred, abusive words, chewing tobacco. He should not be fearful, angry, rude and revengeful but bear oneness, equality, love and affection for students and try to be friendly.

**Raji, P., M, A.( 2010).** Gender Experiences in IT@School, an ICT enabled education project of Kerala, India. *The Journal of Community Informatics, North America*, retrieved from <<http://ci-journal.net/index.php/ciej/article/view/534/514>>.

The turn of the century saw the emergence of a global partnership committed to time bound goals for poverty eradication and sustainable development. The Millennium Declaration signed by over 147 nations recognizes the pivotal role of information and communication technologies in accelerating the development process and it resolves to make its benefits available to all. It was followed by a spurt of Information and Communication Technology (ICT) based activities across the world. The Indian state of Kerala broke new ground with the launching of IT@School, a project for ICT enabled education in schools and Akshaya<sup>1</sup>, a project for e-literacy.

**Bose, S. (2010).** Enabling Secondary Level Teachers to Integrate Technology through ICT Integrated Instructional System. Online Submission.

Institutions providing pre-service teacher education are responsible for preparing teachers capable of functioning in the knowledge society, which India aspires to be. Schools of a knowledge society would require teachers to integrate technology into the instructional system and they are to be prepared for it accordingly through teacher education programmes, especially pre-service ones. With this requirement as a backdrop and on the basis of the argument that teachers are to be taught through methods, which they are later expected to adopt, this article aims to highlight the need to integrate technology in the instructional system of teacher education institutions of India. In this article only the secondary level of teacher education of India (Bachelor of Education) has been considered and it has been emphasized that teachers need to be taught during teacher education programmes through methods that integrate Information and Communication Technology (ICT) so that they may be prepared to integrate ICT when they teach in schools. The article first upholds the rationale for shifting towards ICT integration. It also clarifies the process of ICT integration and thereby underscores the difference between occasional use of ICT and ICT integration in the instructional system. While depicting the present scenario with only occasional use of ICT supplementing traditional methods of teaching, it has been cautioned that the present practice, which does not amount to technology integration, could leave teacher trainees unprepared for integrating technology when they teach in schools

**Sharma, D., & , V. Singh (2010).** ICT in universities of the Western Himalayan Region of India II: A comparative SWOT analysis.

The paper presents a comparative analysis of a case study carried out to understand the performance and impact of ICT initiatives taken by the Universities located in the Western Himalayan Region of India. A basic four- tier framework has been used to carry out this study.

Accordingly, a pre- structured questionnaire on ICT initiatives, status and accomplishments, containing 117 questions divided in 18 groups, was prepared and given to the Head of the Department (HOD) of ICT in the Universities, who along with his technical team, supplied the feedback on a five- point scale. In each of the groups, at least one question was related to performance (as performance indicator) which was identified and thus another special group ‘S’ was created. In order to assess the respective performance and impact, a standard statistical analysis was carried out in terms of the weighted mean and the correlation (Pearson’s) coefficients (CC) validated by t-test. The finding of the study are (i) a dynamic academic leadership and a properly trained skilled human resource yield better performance and impact leading to effective problem solving capability, research output and actual placements. This aspect is being implemented in most of the universities effectively and the performance is found to vary from one to another university (ii) For most of the groups the CC, with the ‘S’ group, was found to be significant, indicating a positive ICT- based performance in the universities (iii) The universities, to a greater extent, have been found to act as nuclei towards creating skilled professionals with enhanced core competence.

**Gaurav Singh and Girijesh Kumar (2010).** ICT in Teacher Education in India: Still In Search Of Its Application. *i-manager’s Journal on School Educational Technology*. 5(3), 49-55.

It is no longer possible to conceive of teacher education without ICTs. It is imperative for the teacher education institutions to wake up and reorganize their curriculum to accommodate the changing face of knowledge. This study conducted by the researcher in teacher education institutions related to availability and access of ICTs in these institutions during session 2008-09, brought forward the real scenario of ICT in teacher education institutions. For this study the researcher used a scale named “ICT Friendliness Scale” developed by Kumar and Singh (2008). Analysis indicates that there is not a single ICT facility, which is present in every teacher education institution. There is non-availability of facilities like Educational software pertaining to school subjects on CDs, Slide Projector, Networking in computer lab, Dial-up/ Broad band Internet Access, LCD Projector, Language Learning Software with Headphones, Electronic versions of common Encyclopedias and Electronic versions of common Encyclopedias in all the Government aided Teacher education Institutions sampled for the study.

Enhancing the quality and accessibility of higher education through the use of Information and Communication Technology.

**G. V. Gopal, G. Viswanathappa, P. Mohan Kumar, Biju K and Nadeemulla Shariff (2010).** Development Of Instructional Modules For ICT Enabled Curriculum Transaction For Various Subjects At Secondary Level For Teacher Empowerment And Their Quality Assessment. *i-manager’s Journal on School Educational Technology*. 5(3),11-17.

Integrated instructional module in various subject areas at secondary level for Kerala developed in a workshop mode and a CD is prepared using Linux-base. Training was given to the teachers in the instructional modules prepared by NIIT i.e. ICR and the same have been evaluated through



a feedback mechanism. This paper is focusing on the comparison of the instructional materials developed by NIIT i.e. ICR with mostly used software quality models. It was an attempt to find out whether the instructional materials as the application software are having the quality characteristics so that the integration of the same in the teaching learning process makes a meaningful effect and appreciable.

**Krishnaveni, D. R., & Meenakumari, J. (2010).** ICT-based Teaching and Learning in Higher Education—A Study. *International Journal of Computer Science & Emerging Technologies*, 261. Technology has become an indispensable tool in all aspects of life. It has transformed our life in many ways including the teaching-learning pattern. At present there is a transformation from traditional learning to a flexible learning scenario. Technology enhances ones learning by eliminating the geographical barriers, time and space constraints thereby enhancing life-long learning. In specific Information and Communication Technologies (ICT) have brought about significant changes in the higher education sector. ICT has been used in various aspects of teaching learning process in higher education. This paper presents the purpose of ICT-based teaching-learning in higher education institutions. It also identifies and presents the various items that contribute to effective ICTbased teaching-learning process. This paper brings out the extent to which the identified items contribute to ICT-based teachinglearning process in the present scenario. A path model for teachinglearning process was built and estimated. The path model was found fit to be implemented in higher education institutions to increase ICT-based teaching-learning process.

**R. Ramesh and B. Sumathi (2010).** CAI in Learning Voice in English Grammar Among Eighth Standard Students—an Experimental Study. *i-manager's Journal on School Educational Technology*, 6(2), 36-41.

English is a language, which is spoken by numerous people across the world. It has acquired a prominent place in meeting the communicational needs of the people. Grammar is a set of rules that helps the people to use the language better. In schools, the teachers of English are considered as the most important factor in making the study of English Grammar successfully. We all know the teachers are experts in their subjects, but faces problems while teaching, because of the overcrowded classroom and heterogeneous group of students. This problem can be overcome by the application of innovative teaching technology. The most striking innovation in the field of educational technology is the application of Computer Assisted Instruction (CAI) in different mode. It makes the children more creative and providing them with an individualized environment. One of the most vital developments in school system is to meet the individual difference among the learners in a satisfying way. Considering the above, the investigators have developed and standardized a CAI package using Macromedia Flash 8 software for learning English Grammar —Voice for Eighth standard students. The selected content Active and Passive Voice is one among the important section in English Grammar. In this study, the quasi-experimental within and between the group pre-test and post-test design was adopted by the

investigators. The investigators have undertaken the experimental study on 89 Eighth standard students of three matriculation schools in Mecheri taluk in Salem. The identified students are allotted randomly for two groups such as control group and experimental group. Pre-test and Post-test were conducted for both the groups. Test of significance difference (t-test) is employed for analyzing the data. The study proves that the learning outcome through CAI is higher than the conventional method. The present study clearly demonstrates that the CAI as individualized self-instructional strategy could be employed for learning English Grammar-Voice in the place of conventional instructional situation.

**R. Ravi and V.A. Malathy (2010).** Multimedia as An Interactive Platform in Learning Volcanoes in Social Sciences Among Upper Primary Students – An Experiment. *i-manager's Journal on School Educational Technology*, 6(2), 42-49

Instructional technology is a growing field which uses technology as a means to solve teaching and learning challenges, both in the classroom and outside the classroom that is in distance learning environments. Multimedia is an interactive instructional technology used in the classroom for teaching learning process has a wide significance to the learners as well as teachers. Multimedia means the integration of continuous media (e.g. audio, video) and discrete media (e.g. text, graphics, images) through which the digital information can be conveyed to the user in an appropriate way. In the present study, the investigators have developed and standardized the Multimedia Package in non-linear way using Macromedia Flash MX software for learning Volcanoes in Social Sciences for upper primary students. The ADDIE model was considered to develop and standardize the Multimedia package. In this study, the experimental method was adopted by the investigators. The Parallel Group Design was chosen in this study in which the Control and Experimental groups were the two groups of parallel group design. Fifty students studying VIII standard from Government Higher Secondary School at Vellalore panchayat in Coimbatore were randomly selected as sample for the study. The fifty students were divided into two groups (i.e.) Control group and Experimental group. Each group comprised of 25 students. The pre-test and post-test were conducted for both groups. Finally the study proves that the learning outcome through multimedia package is higher than the traditional method. Hence, it concludes that the multimedia package developed and standardized for learning volcanoes in social sciences is so effective tool and the same can be implemented to enhance the learning activities of the students.

**Pradeep kumar misra (2010).** Empowering School Teachers for Emerging Technologies: An Action Plan. *i-manager's Journal on School Educational Technology*, 6(1),14-23.

Possessing openness to emerging technologies is critical for teachers in the technology-rich 21st Century as technology continues to accelerate at a rapid rate. Readiness for new technologies is a challenge associated with change. Teachers who resist change may impede and/or limit their students' learning and skills. Teachers, therefore, must prepare students by teaching knowledge and skills necessary for students to be successful in the technology-rich 21st Century” (Niles, 2007,

p.27). In this context, school teachers need to understand how emerging technologies work, what they offer, and to use them for betterment of teaching learning process. Here a pertinent question arises that what approach should be adopted to empower school teachers for emerging technologies. To critically and systematically deal with these issues, author talks about emerging technologies in education, their impact on teaching-learning process and need for Tech-savvy teachers. This discussion is followed by a detailed action plan to empower school teachers for emerging technologies. The proposed action plan is based on the approach that three parties namely NCTE (National Council for Teacher Education), Teacher Education Departments/Institutions and school teachers themselves are key to fulfill this promise.

**Naved Ahmad and Nishat Fatima (2009).** Usage of ICT Products and Services for Research in Social Sciences at Aligarh Muslim University, DESIDOC. *Journal of Library & Information Technology*, 29(2), 25-30

The paper is a finding of a study of the social sciences researchers' use of information and communication technologies (ICTs) in the Aligarh Muslim University (AMU). A well-structured questionnaire was used to collect the data. The study shows that researchers use a variety of ICT products and services for their research work as these products prove very helpful in finding needed information quickly and easily and also help the researchers to access, manage, integrate, evaluate, create, and communicate information more easily. The study also identifies lack of training and technical knowledge to use ICTs as the major hindrances faced by the researchers in AMU. The paper recommends proper training and guidance for use of ICT-based technologies for the optimum utilization of these services by the researchers.

**Kumar, L. (2009).** GIS Enabled PBL Pedagogy: the Effects on Students' Learning in the Classroom. *i-manager's Journal on School Educational Technology*. 5(2) 15-27.

In efforts aimed at acquainting learners with 'how to learn' skills rather than static content knowledge, more student-centric instructional approaches are being increasingly adopted in informing curriculum design and delivery. Technology-rich problem solving environments offer great promise in scaffolding and facilitating student-centered learning. Geographic information system is one powerful technology that enables learners to become proficient spatial problem solvers, analytical users of geographic information and expert decision makers. This paper investigates the pedagogical benefits of GIS in influencing students' problem solving performances in Singapore. Data was collected by administering a likert-scale based questionnaire constructed specifically for this study and analyzed using statistical method. Students participated in this research highlighted many of the instructional strengths of GIS that enabled them to become competent problem solvers and self-directed learners. They also pointed out some of the challenges which educators need to bear in mind in the development and enactment of GIS enabled pedagogy.

**Vidyashankar, G. S., & Sai, L. P. (2009).** ICT-based Education in Schools: Emerging Business Models in India. 13th UNESCO-APEID International Conference Indian Institute of Technology Madras, INDIA

Government of India, as part of its 11th Five Year Plan, continues to support federally sponsored scheme, known as “Sarva Siksha Abhiyan,” with the objectives of providing school education to every child between the age of 6 and 14 years and improving the quality of school education in the country. For the FY2009, a substantially higher budget of US\$ 7 Billion has been allocated to the novel scheme, which also aims at fostering ICT-based education in schools. A novel feature of this ambitious program pertains to collaborating with the Indian private sector to evolve sustainable Public-Private Partnerships (PPP), not only to improve the quality of education but also to equip students to meet the needs of industries. This paper provides insights into the emerging business models in the context of imparting ICT-based education in Indian schools. While deliberating on the enablers of ICT-based education in developed countries, the paper explores the challenges faced by developing countries. Apart from discussing the PPP-related business opportunities in the education industry, the enabling policy guidelines of the Government of India have been outlined. The paper also highlights the strategic perspectives of the firms in the Indian education industry.

**Snehi, N. (2009).** ICT in Indian Universities and Colleges: Opportunities and Challenges. *Management & Change*, 13(2), 231-244.

Higher education in the country is experiencing a major transformation in terms of access, equity and quality. This transition is highly influenced by the swift developments in information and communication technologies (ICTs) all over the world. The optimal utilization of opportunities arising due to diffusion of ICTs in higher education system presents a profound challenge for higher education institutions. At the same time the introduction of ICTs in the higher education has profound implications for the whole education process ranging from investment to use of technologies in dealing with key issues of access, equity, management, efficiency, pedagogy and quality. In this regard the paper addresses the opportunities and challenges posed by integration of ICTs in various aspects of higher education in the present scenario. The paper argues for addressing the issues through formulation of policies and strategies to accrue following potential future developments in ICTs and to integrate them in education sector to transform higher education.

**Parthasarathy. M, R. Ananthasayanam & R. Ravi (2009).** Virtual Classroom: Architecture and its future in Educational Institutions. *i-manager's Journal on School Educational Technology*. 5(3) 34-40.

The educational system around the world is undergoing a tremendous change in the area of knowledge and strategy. In general, the curriculum practices have revolutionized by the academicians and educational administrators. The learners have also demand varied types of knowledge and skills required for their day-to-day activity. Nature and the forms of educational

system should accommodate the requirement of the nation and society in general individual learner in particular. The traditional classroom approaches requires a tremendous change in the way of delivery and knowledge transmission for the development of cognitive and non-cognitive areas of learning with emphasize on qualities of personal and social growth. The education commissions and committees have also recommended and stressed that education should be made both universally available and more relevant. In this context this paper suggests a learner-centered approach for the demands of the nation and the society at large. The learner-centered approach suggested by this paper, a Virtual Classroom (VC) approach is a stress on its architecture, facilities, interactivity and network. Based on the criteria the authors has developed three models of VC approach and future benefits of these approaches for knowledge management system for effective acquisition, sharing, utilization and creation of knowledge in the area of teaching-learning process.

**R. Ananthasayanam, Thangam Rajathi and B. Tamilselvi (2009).** Virtual Classroom: A Boon To Learners. *i-manager's Journal on School Educational Technology*. 5(3) 17-22.

Demands for a more personalized approach to education as well as flexibility have spurred learners to seek alternatives to the traditional approach. As a result of technological advantages in society, the options for learning in and outside the classroom have broadened tremendously. The great option is “Virtual classroom”. A virtual classroom is a system that creates an environment designed to facilitate teachers in the management of educational courses for their students, especially a system using computer hardware and software, which involves distance learning.

Education in the virtual classrooms has been described as being “just as vivid, meaningful and dynamic as face-to-face interactions in a traditional classroom — or even more so”. As the virtual classroom is one that aims to give the student an experience equal to or better than the sort they would find in a traditional classroom, there are obviously many advantages of the virtual classroom to the student, as well as the teacher and the associated educational institution. Virtual classrooms “foster the dimensions of interest, involvement, imagination, and interactivity”, which make the virtual classroom an “immersive environment in which to learn”, perhaps even more immersive than the traditional classroom because of what is offered by new technologies used in the virtual classroom.

This paper discusses the virtual classroom as a new move in the non-formal distance education, which is an advanced technique of Education Technology. The Collaborative and Independent virtual learning types form the key features for Communication, Assessment and Support. Moreover, a comparison of this virtual classroom with the traditional classroom blooms out the merits of virtual classroom which is definitely “A Boon to the Learners”.

**Hattangdi, A., & Ghosh, A. (2008).** In International Conference on Emergent Missions, Resources, and the Geographic Locus in Strategy as a part of the 11th Annual Convention of the Strategic Management Forum (SMF), India 2008 (Vol. 2011, pp. 1-14).

Changes in the economic and social fundamentals call for transformation in the skills, capabilities and attitudes of the masses. This requires a shift in the delivery and pedagogy used in the current education system. The purpose of this paper is to promote integration of Information and Communication technologies (ICT) in higher education for imparting easily accessible, affordable and quality higher education leading to the economic upliftment of India. The focus of the paper is on the benefits that ICT integration in education can provide, right from breaking time and distance barriers to facilitating collaboration and knowledge sharing among geographically distributed students. The findings reveal that it also facilitates sharing of best practices and knowledge across the world. ICT increases the flexibility of delivery of education so that learners can access knowledge anytime and from anywhere. It can influence the way students are taught and how they learn as now the processes are learner driven and not by teachers. This in turn would better prepare the learners for lifelong learning as well as to contribute to the industry. It can improve the quality of learning and thus contribute to the economy. It provides several tangible and intangible benefits for all stakeholders involved in the economic growth of the country. Wider availability of best practices and best course material in education, which can be shared by means of ICT, can foster better teaching. ICT also allows the academic institutions to reach disadvantaged groups and new international educational markets. Thus, ICT enabled education will ultimately lead to the democratization of education. Especially in developing countries like India, effective use of ICT for the purpose of education has the potential to bridge the digital divide. The paper also explores the factors related to policy, planning, technical requirements as well as the training required for the stakeholders for the successful implementation of ICT in an education system. These steps would ensure that accountability, quality assurance, accreditation and consumer protection in ICT based education is taken care of.

**Mooij, T. (2007).** Design of educational and ICT conditions to integrate differences in learning: Contextual learning theory and a first transformation step in early education. *Computers in Human Behavior*, 23(3), 1499-1530

Educational differentiation and ICT can be designed to better recognize and integrate learning differences across students particularly by assisting instructional management and the self-regulation of students. A conceptual framework for such practice is elaborated here. First, learning as an interactional co-constructive process at various levels is considered. The diagnostic, instructional, management and system aspects of the learning process can be stimulated and maximized. Second, differentiation of learning procedures and materials, design of integrating ICT support, and improvement of development and learning progress are recommended as contextual conditions to optimize the learning process. The combination of the learning aspects with these contextual conditions provides theoretical guidelines for the transition from a no differentiating system of education to a differentiating, ICT-based system of instructional management for all students. Information is given about the realization of two of the differentiation guidelines and all ICT design guidelines. The first products were used in kindergarten, to start the improvement of educational practice. This occurred in co-development

with kindergarten teachers of three Dutch kindergartens. Information is given about the process and outcomes of this first transformation step in practice. Finally, next co-development steps are discussed.

**K. Srinivasan (2007).** Participation Levels of Primary School Teachers viewing Pre-Recorded Video Programme: An analysis of Teachers Training programme, 2(4),49-52.

The article provides a detailed analysis of the teachers who attended the training for primary education and viewed pre-recorded cassette using Group Observation method. First the paper discusses detailed methodology on group observation and in the second part the findings suggests that for better production of any video programme for training the teachers should contain innovation and novel approaches, should be applied.

**Mahender Reddy Sarsani (2007).** The Attitude of Teacher Trainees towards the Teaching of Computer Education at B.ED level. *i-manager's Journal on School Educational Technology*. 2(3) 56-67.

Tremendous changes are taking place in the world which certainly influences the system of education, and teacher education too cannot remain immune to these global changes. Information Technology (IT) is affecting teachers, individuals and the society. Digital learning has opened the doors of classroom and made knowledge accessible even for those sitting at home. The preparation of teacher has changed with the passage of time and with the change in expectations of the society. Teachers have always played a crucial role in preparing communities and societies towards exploring new horizons and achieving higher level of progress and development. The teacher educators occupy a pivotal position in the system of education. The success of any educational reform depends upon the quality of teachers and in turn the quality of teachers depends to a large extent on the quality of teacher education. In view of the above said fact, the computer education paper was introduced as a compulsory paper in the common core curriculum for B. Ed course, for all the secondary teacher-training institutions in the state. The present researcher conducted a survey with a designed questionnaire to assess the computer usage and computer literacy and the attitude of B. Ed trainees towards teaching computer education. A sample of 200 B. Ed. students from Government and Private Colleges of Education, comprising male and female, were included from the Kakatiya University region, to make a thorough analysis with statistical evidences. The study reveals many facts regarding the availability of computer in educational institutions and the percentage of student and teacher users.

**Singaravelu G and T. Muthukrishnan (2007).** Influence Of User – Friendly Self-Motivated Learning Gadget In Learning Syllables Of English At Standard VI. *i-manager's Journal on SchoolEducationalTechnology*.2(3)79-85.

The present study illuminates the causes of the learners in identifying and discriminating syllables and syllabic words in English. It displays the ways for eliminating syllables and syllabic words in English by using self-motivated learning gadget. Single group experimental

method was adopted for the study. Fifty students studying in standard VI were selected for the study. Achievement tests (pre-test & post-test) were used for the study. It concludes that identifying syllables and syllabic words in English by using Self-Motivated-Learning-Gadget is more effective than the conventional method.

**S. Chandrakanthi, R. Ananthasayanam and R. Ravi (2007).** Enhancing reading comprehension of Struggling Comprehenders through Computer based Instruction. *i-manager's Journal on School Educational Technology*. 2(3),27

In the computer age, challenges have gained a new quality, and teachers, especially with their pedagogic responsibilities, have gained a new role to play. To familiarize themselves with the new technology and to become aware of its value in language education, the potentials of this new technology can be utilized to enhance the basic language skills. Reading is a complex activity that demands simultaneous application of a variety of cognitive processes. In learning to read, all students do not progress at the same rate. Hence, the reading class requires a more individualized, student-centered approach. Since computer-assisted instruction is particularly effective in presenting content which needs mastery or comprehension, and in catering to the needs of students of all levels, integration of this approach into reading curriculum can be given desired attention. This paper will focus on providing guidelines and suggestions of developing traditional and innovative activities for a self-instructional reading program that can be used in learning and testing EST reading for slow learners.

**Arora, P. (2007).** The ICT Laboratory: An Analysis of Computers in Government Schools in Rural India. *AACE journal*, 15(1), 57-72.

There has been a strong push towards e-literacy in India, particularly in the distribution and usage of information and communication technologies (ICT) in schools for economic and social growth. As a result, the Vidhya Vahini scheme was launched in Kuppam, a marginalized village constituency in Andhra Pradesh. This scheme strived to disseminate computers to all high schools by 2005 with the intention of scaling this pilot initiative nationwide. In this article, I argue that in spite of strong governmental initiative and multifarious private-public partnerships, there are considerable barriers in the implementation of computers in public high schools. To optimize these cost intensive resources, we need to address some of the chronic educational challenges prevalent in the school system. With the constant flux in participation by public and private actors in this process, the question of sustainability is critical in the transformation of schools as e-learning communities.

**Khirwadkar, A. (2007).** Integration of ICT in education: pedagogical issues. Assumption University: *Education Review* 1(4) 50-58.

The progress of any country depends upon the quality of education offered and its practices. Indian education was well known for its Gurukul system of education in the Vedic age. Education in India has undergone various phases and stages of development starting in the Vedic



age to the post-independent period. At all stages of development there was a concern for bringing in quality education reflecting on the practical aspects in education.

**Basant, R., Commander, S. J., Harrison, R., & Menezes-Filho, N. (2006).** ICT adoption and productivity in developing countries: new firm level evidence from Brazil and India. IZA Discussion Paper Series. No. 2294

This paper uses a unique new data set on nearly a thousand manufacturing firms in Brazil and India to investigate the determinants of ICT adoption and its impact on performance in both countries. The descriptive evidence shows that Brazilian firms on average use ICT more intensively than their Indian counterparts but changes over time have been rather similar in both places. Within countries ICT intensity is strongly related to size, ownership structure, share of administrative workers and education. The econometric evidence documents a strong relationship between ICT capital and productivity in both countries, even after controlling for several other factors, including firm-specific fixed-effects. The rate of return of ICT investment seems to be much larger than usually found in more developed countries. Specific types of organizational changes matter for the return of ICT, but only for high adopters. Firms report several constraints to ICT investment in both countries and power disruption seems to significantly depress adoption and returns to ICT expenditures in India. This may be indicative of the impact of a cluster of poor institutions and/or infrastructure on performance.

**Singaravelu G (2006).** Impact of Curriculum Strategies in Ameliorating Communicative Skill in English. *i-manager's Journal on School Educational Technology*, 2(1), 59-62.

The Study investigated the problems of the students in improving communicative skill in English at standard VII and found the impact of creative competency (new curriculum strategy) to eliminate the problem of it. Eighty eight subjects were involved in the study. Achievement test was considered as instrumentation for the study. Creative competency strategy in the curriculum of English is more effective than traditional curriculum strategy in learning communicative skill.

**Senapaty, H. K. (2005).** Teachers Education in a new Paradigm of ICT Integrated Constructivists Learning. *Journal of Computer and Education*, 2(7).

Paradigm shifts in education in recent years envisions a new type of learning culture that demands ICT integration with pedagogy in Teacher Education Programme. Implementing the pedagogy-technology integration in teacher education and managing the changes are highly complex and possibly one of the most challenging tasks for any teacher education institution. ICT has to be infused into pedagogy in such a way that its uses can improve learning. The proposed model is derived from international and national studies on ICT development that has identified a series of broad stages that educational system and institutions typically proceed through in the adoption and the use of ICT. These broad stages have been termed as Emerging, Applying, Infusing and Transforming stages of ICT development (UNESCO, 2005). The model is then mapped on the basis of: (a) stages of ICT usage and (b) pedagogical usages of ICT. At the

heart of good teaching with technology there are three core components: content, pedagogy, and technology, along with the relationships among and between them. The interactions among the three components, account for the wide variations seen in the extent and quality of pedagogy technology integration. These three knowledge bases (content, pedagogy, and technology) form the core of the technology, pedagogy, and content knowledge (TPACK) framework (Koehler & Mishra, 2008; Mishra & Koehler, 2006). The framework describes how teachers' understandings of technology, pedagogy, and content can interact with one another to produce effective discipline-based teaching with educational technologies. In this framework, there are three interdependent components of teachers' knowledge: Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK). In view of this, here an attempt has been made to discuss various issues and strategies for implementation of pedagogy technology integration in teacher education for teacher development.

**Shah, B. (2004).** Edusat project: Challenges and opportunities for teachers' training. University News, *AIU*, 42(19), 1-11.

Research evidence has shown that Edusat provide syllabus oriented programme, regional languages, in the classroom situation and in presence of teacher/instructor. All these will significantly lead to reduction in educational lag, close traditional learning gaps and consolidate national system that offer quality services to all sectors of society.

**Sharma, R. C. (2003).** Barriers in using technology for education in developing countries. In *Information Technology: Research and Education*,. Proceedings. ITRE2003. International Conference on (pp. 512-516). IEEE.

The World Conference on Education for All, held in Jomtien (Thailand) in 1990 highlighted the timely significance of catering to the learning needs of all children, youth and adults, who have been excluded and unreached by the existing system of formal and no formal education. ICTs can support education through various ways. We deal with the barriers in using technology for education in developing countries. The most notable barriers to the use of ICT in education are allocation of proper funds, level of teacher knowledge, government policies, and the gap between the various sections of society. Various recommendations such as the use of FM radios, television lessons, teleconferencing and continuous monitoring of ICT projects are suggested to overcome these problems.

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