CHAPTER IV
ICT AND EDUCATION

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ICT AND EDUCATION

Globalization and technological change—processes that have accelerated in tandem over the past years—have created a new global economy “powered by technology, fueled by information and driven by knowledge.” The emergence of this new global economy has serious implications for the nature and purpose of educational institutions. As the half-life of information continues to shrink and access to information continues to grow exponentially, educational institutions cannot remain mere venues for the transmission of a prescribed set of information from teacher to student over a fixed period of time. Rather, they must promote “learning to learn,” i.e., the acquisition of knowledge and skills that make possible continuous learning over the lifetime. “The illiterate of the 21st century,” according to futurist Alvin Toffler, “will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn.”

Concerns over educational relevance and quality coexist with the imperative of expanding educational opportunities to those made most vulnerable by globalization - developing countries in general; low-income groups, girls and women, and low-skilled workers in particular. Global changes put pressure on all groups to constantly acquire and apply new skills. The ILO defines the requirements for education and training in the new global economy simply as “Basic Education for All”, “Core Work Skills for All” and “Lifelong Learning for All”.

Information and communication technologies (ICTs)—which include radio and television, as well as newer digital technologies such as computers and the Internet—have been touted as potentially powerful enabling tools for educational change and reform. When used appropriately, different ICTs can help in expanding access to education, strengthen the relevance of education to the increasingly digital workplace, and raise educational quality by transforming teaching and learning into an engaging, active process connected to real life. However, the experience of introducing different ICTs in the classroom and other educational settings all over the world over the past several decades suggests that the full realization of the potential educational benefits of ICTs is not automatic.

The effective integration of ICTs into the educational system is a complex, multifaceted process that involves not just technology but also curriculum and
pedagogy, institutional readiness, teacher competencies, and long-term financing, among others. The policymakers in developing countries should formulate a framework for the appropriate and effective use of ICTs in their educational systems.

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. But the use of computers and the Internet is still in its infancy in many developing countries. Even if it is there, its use is constrained, due to limited infrastructure and the attendant high costs of access. In spite of many constraints, many countries are trying to overcome this deficiency by using different technologies in combination rather than as the sole delivery mechanism. For example, the Kothmale Community Radio uses both radio broadcasts and computer and Internet technologies to facilitate the sharing of information and provide educational opportunities in a rural community in Sri Lanka. The Open University of the United Kingdom (UKOU), established in 1969 as the first educational institution in the world wholly dedicated to open and distance learning, still relies heavily on print-based materials supplemented by radio, television and, in recent years, online programming. Similarly, the Indira Gandhi National Open University in India combines the use of print, recorded audio and video, broadcast radio and television, and audio conferencing technologies.

4.1 e-learning

Although most commonly associated with higher education and corporate training, e-learning encompasses learning at all levels, both formal and non-formal, that uses an information network—the Internet, an intranet (LAN) or extranet (WAN)—whether wholly or in part, for course delivery, interaction and/or facilitation. Some prefer the term online learning. Web-based learning is a subset of e-learning and refers to learning using an Internet browser.

4.2 Blended Learning

Blended learning refers to learning models that combine traditional classroom practice with e-learning solutions. Students in a traditional class can be assigned both print-based and online materials, have online mentoring sessions with their teacher through chat, and are subscribed to a class email list. Or a Web-based training course can be enhanced by periodic face-to-face instruction. “Blending “was prompted by the
recognition that not all learning is best achieved in an electronically-mediated environment, particularly one that dispenses with a live instructor altogether. Instead, consideration must be given to the subject matter, the learning objectives and outcomes, the characteristics of the learners, and the learning context in order to arrive at the optimum mix of instructional and delivery methods.

4.3 Open and Distance Learning

Open and distance learning is defined by the Commonwealth of Learning as “a way of providing learning opportunities that is characterized by the separation of teacher and learner in time or place, or both time and place; learning that is certified in some way by an institution or agency; the use of a variety of media, including print and electronic; two-way communications that allow learners and tutors to interact; the possibility of occasional face-to-face meetings; and a specialized division of labour in the production and delivery of courses.”

4.4 Learner-centered Environment

The National Research Council of the U.S. defines learner-centered environments as those that “pay careful attention to the knowledge, skills, attitudes, and beliefs that learners bring with them to the classroom.” The impetus for learner-centredness derives from a theory of learning called constructivism, which views learning as a process in which individuals “construct” meaning based on prior knowledge and experience. Experience enables individuals to build mental models or schemas, which in turn provide meaning and organization to subsequent experience. Thus knowledge is not “out there”, independent of the learner and which the learner passively receives; rather, knowledge is created through an active process in which the learner transforms information, constructs hypothesis, and makes decisions using his/her mental models. A form of constructivism called social constructivism also emphasizes the role of the teacher, parents, peers and other community members in helping learners to master concepts that they would not be able to understand on their own. For social constructivists, learning must be active, contextual and social. It is best done in a group setting with the teacher as facilitator or guide.
4.5 Uses of ICT in Education

ICT is being utilized in every part of life. Due to the increasing importance of the computer, students—the future citizens cannot afford to keep themselves aloof from this potential medium. In education, use of ICT has become imperative to improve the efficiency and effectiveness at all levels and in both formal and non-formal settings. It can be used for the following purposes.

- To broadcast material, online facility or CD-ROM as sources of information
- To use the online resource like, email, chat, discussion forum to support collaborative writing and sharing of information
- To facilitate video-conferencing or other form of Tele conferencing to involve wide range of students from distant geographic areas
- To blend learning by combining conventional classroom learning with E-learning systems
- To process administrative and assessment data
- To exchange and share ideas among teachers for the professional growth
- To carry out internet based research to enhance, educational process
- To facilitate communication for pupils with special needs
- To use electronic toys by children to develop spatial awareness and psychomotor control

4.6 Advantages of the Use of ICT in Education

In education, communication process takes place among teachers, students, management and administrative personnel which requires plenty of data to be stored for retrieval as and when required and to be disseminated or transmitted in the desired format. ICT techniques are used for processing such data. In this context, advantages of ICT in education can be listed as follows.

- **Quick access to information**: Information can be accessed in seconds by connecting to the internet and surfing through Web pages.

- **Easy availability of updated data**: Sitting at home or at any comfortable place the desired information can be accessed easily. This helps the students to learn the
updated content. Teachers too can keep themselves abreast of the latest teaching learning strategies and related technologies.

- **Connecting Geographically dispersed regions:** With the advancement of ICT, education does not remain restricted within four walls of the educational institutions. Students from different parts of the world can learn together by using online, offline resources. This would result in the enriching learning experience. Such collaborative learning can result in developing divergent thinking ability, global perspective, and respect for varied nature of human life and acculturation.

- **Catering to the Individual differences:** ICT can contribute in catering to individual needs of the students as per their capabilities and interest. Crowded classrooms have always been a challenge for the teacher to consider the needs of every student in the class.

- **Widening the range of communication media in education:** With the advent of ICT, different means of communication are being introduced in the teaching learning process. Offline learning, online learning, and blended learning can be used in educational institutions. Collaborative learning or individualized learning strategies can enhance the quality of group as well as individual learning.

- **Wider learning opportunities for students:** Application of latest ICT resources in education has provided many options to the learners. Many Online courses are available for them to select any as per their aptitude and interest. Students can evaluate their own progress through different quizzes, ready to use online tests. This can ensure fulfillment of the employment required in the job market thus minimizing the problem of unemployment. It can also provide more efficient and effective citizens to the society as per the changing needs.

### 4.7 Potential of ICT for Creating a Powerful Learning Environment

Just as people differ in many respects, so as ways in which they learn. It is essential, therefore to give attention to the characteristics, abilities, and experiences of the learners - both as a group and as individuals. ICT can contribute in creating powerful learning environment in numerous ways. ICT provides opportunities to access information from multiple resources and to view it from multiple perspectives, thus fostering the authenticity of learning environments. ICT may also make complex processes easier to understand through simulations. Thus, ICT may function as a
facilitator of active learning and higher-order thinking. The use of ICT may foster co-operative learning and reflection about the content. Furthermore, ICT may serve as a tool to curriculum differentiation, providing opportunities for adapting the learning content and tasks to the needs and capabilities of each individual pupil and by providing tailored feedback.

4.8 Promise of ICTs in Education

For developing countries ICTs have the potential for increasing access to and improving the relevance and quality of education. It represents a potentially equalizing strategy for developing countries.

[ICTs] greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities for business and the poor. One of the greatest hardships endured by the poor, and by many others, who live in the poorest countries, is their sense of isolation. The new communications technologies promise to reduce that sense of isolation, and to open access to knowledge in ways unimaginable not long ago.

However, the reality of the Digital Divide—the gap between those who have access to and control of technology and those who do not—means that the introduction and integration of ICTs at different levels and in various types of education will be a challenging task. Failure to meet the challenge would mean a further widening of the knowledge gap and the deepening of existing economic and social inequalities.

4.8.1 ICTs can expand access to education

ICTs are a potentially powerful tool for extending educational opportunities, to previously underserved constituencies—scattered and rural populations, groups traditionally excluded from education due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as all others who for reasons of cost or because of time constraints are unable to enroll on campus. But the emergence and application of ICT has changed the scenario.

Anytime, anywhere - One defining feature of ICTs is their ability to transcend time and space. ICTs make possible asynchronous learning, or learning characterized by absence of time lag between the delivery of instruction and its reception by learners.
Online course materials, can be accessed 24 hours a day, 7 days a week. ICT-based educational delivery (e.g., educational programming broadcast over radio or television) also dispenses with the need for all learners and the instructor to be in one physical location. Additionally, certain types of ICTs, such as teleconferencing technologies, enable instruction to be received simultaneously by multiple, geographically dispersed learners (i.e., synchronous learning).

Access to remote learning resources - Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in for their educational needs. With the Internet and the World Wide Web, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at any time of the day and by an unlimited number of people. This is particularly significant for many schools in developing countries, and even some in developed countries, that have limited and outdated library resources. ICTs also facilitate access to resource persons—mentors, experts, researchers, professionals, business leaders, and peers—all over the world.

4.8.2 ICT prepares individuals for the workplace

One of the most commonly cited reasons for using ICTs in the classroom has been to better prepare the current generation of students for a workplace where ICTs, particularly computers, the Internet and related technologies, are becoming more and more ubiquitous. Technological literacy, or the ability to use ICTs effectively and efficiently, is thus seen as representing a competitive edge in an increasingly globalizing job market. But technological literacy is not the only skill that is required for the global economy. EnGauge of the North Central Regional Educational Laboratory (U.S.) has identified what it calls “21st Century Skills,” which includes digital age literacy (consisting of functional literacy, visual literacy, scientific literacy, technological literacy, information literacy, cultural literacy, and global awareness, inventive thinking, higher-order thinking and sound reasoning, effective communication, and high productivity. The potential of ICTs to promote the acquisition of these skills is tied to its use as a tool for raising educational quality, including promoting the shift to a learner-centered environment.
### Table 4.1

**Skill Needed in the Workplace of the Future**

<table>
<thead>
<tr>
<th>Digital Age Literacy</th>
<th>Ability to decipher meaning and express ideas in a range of media; this includes the use of images, graphics, video, charts and graphs or visual literacy</th>
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<tbody>
<tr>
<td>Functional Literacy</td>
<td>Understanding of both the theoretical and applied aspects of science and mathematics</td>
</tr>
<tr>
<td>Scientific Literacy</td>
<td>Ability to find, evaluate and make appropriate use of information including via the use of ICTs</td>
</tr>
<tr>
<td>Technological Literacy</td>
<td>Competence in the use of information and communication technologies</td>
</tr>
<tr>
<td>Information literacy</td>
<td>Ability to interact smoothly and work effectively with others</td>
</tr>
<tr>
<td>Cultural Literacy</td>
<td>Appreciation of the diversity of cultures</td>
</tr>
<tr>
<td>Global awareness</td>
<td>Understanding of how nations, corporations and communities all over the world are interrelated.</td>
</tr>
<tr>
<td>Inventive Thinking</td>
<td>Ability to use imagination to create new things</td>
</tr>
<tr>
<td>Adaptability</td>
<td>Ability to adapt and manage in a complex, interdependent world</td>
</tr>
<tr>
<td>Curiosity</td>
<td>Desire to know</td>
</tr>
<tr>
<td>Creativity</td>
<td>Ability to make appropriate use of information including via the use of ICTs</td>
</tr>
<tr>
<td>Risk-taking</td>
<td>Ability to interact smoothly and work effectively with others</td>
</tr>
<tr>
<td><strong>High Order Thinking</strong></td>
<td>Creative problem-solving and logical thinking that result in sound judgments</td>
</tr>
<tr>
<td>Effective Communication</td>
<td>Ability to prioritize, plan, and manage programs and projects to achieve the desired results. Ability to apply what they learn in the classroom to real-life contexts to create relevant, high–quality products.</td>
</tr>
</tbody>
</table>

Source: Adapted from EnGauge. North Central Regional Educational Laboratory, Available online at [Http://www.ncrel.org/enguge.skills/21skills.htm](http://www.ncrel.org/enguge.skills/21skills.htm).
4.8.3 ICT Improves the quality of education

Improving the quality of education and training is a critical issue, particularly at a time of educational expansion. ICTs can enhance the quality of education in several ways: by increasing learner motivation and engagement, by facilitating the acquisition of basic skills, and by enhancing teacher training\textsuperscript{xii}. ICTs are also transformational tools which, when used appropriately, can promote the shift to a learner-centered environment.

Motivating to learn - ICTs such as videos, television and multimedia computer software that combine text, sound, and colorful moving images can be used to provide challenging and authentic content that will engage the student in the learning process. Interactive radio likewise makes use of sound effects, songs, dramatizations, comic skits, and other performance conventions to compel the students to listen and become involved in the lessons being delivered. More so than any other type of ICT, networked computers with Internet connectivity can increase learner motivation as it combines the media richness and interactivity of other ICTs with the opportunity to connect with people and to participate in world events.

Facilitating the acquisition of basic skills - The transmission of basic skills and concepts that are the foundation of higher order thinking skills and creativity can be facilitated by ICTs through drill and practice. Educational television programs use repetition and reinforcement to teach the alphabet, numbers, colors, shapes and other basic concepts. Most of the early uses of computers were for computer-based learning (also called computer-assisted instruction) that focused on mastery of skills and content through repetition and reinforcement.

Enhancing teacher training - ICTs have also been used to improve access to and the quality of teacher training. It provides latest information and ideas to teachers to make their teaching more interesting.

4.8.4 ICT transforms the learning environment into one that is learner-centered

Appropriate use of ICTs can catalyze the paradigmatic shift in both content and pedagogy. If designed and implemented properly, ICT-supported education can promote the acquisition of the knowledge and skills that will empower students for lifelong learning. These new ways of teaching and learning are underpinned by
constructivist theories of learning and constitute a shift from a teacher-centered pedagogy to one that is learner-centered.

Table 4.2

Overview of Pedagogy in the Industrial versus the Information Society

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Less (traditional pedagogy)</th>
<th>More (Emerging pedagogy for the information society)</th>
</tr>
</thead>
</table>
| Active    | • Activities prescribed by the teacher  
            • Whole class instruction  
            • Little variation in activities  
            • Pace determined by the programme | • Activities determined by learners  
            • Small groups  
            • Many different activities  
            • Pace determined by learners |
| Collaborative | • Individual  
            • Homogenous groups  
            • Everyone for him/herself | • Working in teams  
            • Heterogeneous groups Supporting each other |
| Creative  | • Reproductive learning  
            • Apply known solutions to problems | • Productive learning  
            • Find new solutions to problems |
| Integrative | • No link between theory and practice  
            • Separate subjects  
            • Discipline-based  
            • Individual teachers | • Integrating theory and practice  
            • Relations between subjects  
            • Thematic  
            • Teams of teachers |
| Evaluative | • Teachers directed  
            • Summative | • Student directed  
            • Diagnostic |


- **Active learning**: ICT-enhanced learning provides tools and mechanisms for examination, calculation and analysis of information, and provides a platform for student inquiry, analysis and construction of new information. Learners learn as they do and work on real-life problems in-depth, making learning less abstract and more relevant to the learner’s life situation. In this way, and in contrast to memorization-based learning, ICT-enhanced learning promotes increased learner engagement. ICT-enhanced learning is also “just-in-time” learning in which learners can choose what to learn when they need to learn it.
**Collaborative learning:** ICT-supported learning encourages interaction and cooperation among students, teachers, and experts regardless of where they are. Apart from modeling real-world interactions, ICT-supported learning provides learners the opportunity to work with people from different cultures, thereby helping to enhance learners’ teaming and communicative skills as well as their global awareness. It models learning done throughout the learner’s lifetime by expanding the learning space to include not just peers but also mentors and experts from different fields.

**Creative Learning:** ICT-supported learning promotes the manipulation of existing information and the creation of real-world products rather from received information.

**Integrative learning:** ICT-enhanced learning promotes a thematic, integrative approach to teaching and learning. This approach eliminates the artificial separation between the different disciplines and between theory and practice that characterizes the traditional classroom approach.

**Evaluative learning:** ICT-enhanced learning is student-directed and diagnostic. Unlike static, text- or print-based educational technologies, ICT-enhanced learning recognizes that there are many different learning pathways and many different articulations of knowledge. ICTs allow learners to explore and discover rather than merely listen and remember.

### 4.9 Levels of Technology Use

The potential of each technology varies according to how it is used. Haddad and Draxler identified five levels of technology use in education: presentation, demonstration, drill and practice, interaction, and collaboration.

Each of the different ICTs—print, audio/video cassettes, radio and TV broadcasts, computers or the Internet—may be used for presentation and demonstration, the most basic of the five levels. Except for video technologies, drill and practice may likewise be performed using the whole range of technologies. On the other hand, networked computers and the Internet are the ICTs that enable interactive and collaborative learning best. Their full potential as educational tools will remain unrealized if they are used merely for presentation or demonstration.
4.10 Issues in the Use of ICTs in Education

Issues which must be discussed when considering the overall impact of the use of ICTs in education can be listed in the following heads - Effectiveness, cost, equity, and sustainability.

4.10.1 The educational effectiveness: The educational effectiveness of ICTs depends on how they are used and for what purpose. And like any other educational tool or mode of educational delivery, ICTs do not work for everyone, everywhere in the same way.

Enhancing access - It is difficult to quantify the degree to which ICTs have helped expand access to basic education since most of the interventions for this purpose have been small-scale and under-reported.

Raising quality - The impact of ICT enabled teaching and learning process on education remains an under-researched area. But few researches suggest that the interventions are as effective as traditional classroom instruction. There are strong evidences to show the ICT’s effectiveness in raising the quality of education as demonstrated by increased scores on standardized tests as well as improved attendance. It is also proven that the ICT interactive classes reduced the dropout rates in many schools in developing countries. The use of computers as tutors, for drill and practice, and for instructional delivery, combined with traditional instruction, results in increases in learning in the traditional curriculum and basic skills areas. Students also learn more quickly, demonstrate greater retention, and are better motivated to learn when they work with computers. Research also suggests that the use of computers, the Internet, and related technologies, given adequate teacher training and support, can indeed facilitate the transformation of the learning environment into a learner-centered one.

4.10.2 Educational cost: Broadly speaking, educational television broadcasts and computer-based and online learning are more expensive. Categorical assessments of cost-effectiveness of different ICT techniques are difficult to make because of lack of data, differences in programs, problems of generalization, and problems of quantification of educational outcomes and opportunity costs. Speaking specifically of computers and the Internet, Blurton argues that “when considering whether ICT is “cost-effective” in educational settings, a definitive conclusion may not be possible
for a variety of reasons. However, when considering the alternative of building more physical infrastructure, the cost savings to be realized from sharing resources, and the societal price of not providing access, ICT as a means of enabling teaching and learning appears to be an attractive and necessary alternative.”

A common mistake in estimating the cost of a particular ICT educational application is to focus too much on initial fixed costs—purchase of equipment, construction of physical facilities, initial materials production, and the like. But studies of the use of computers in classrooms, for example, show that installation of hardware and retrofitting of physical facilities account for only 40% to 60% of the full cost of using the computers over their lifetime, or its total cost of ownership.xvi. In fact, while at first glance it may seem that the initial purchase of hardware and software is the costliest part of the process, the bulk of the total cost of ownership is spread out over time, with annual maintenance and support costs (known as variable or recurrent costs) constituting between 30% to 50% of the total cost of hardware and software. The cost of professional development, another variable cost, also accumulates over time. For computer-based approaches the total cost of ownership therefore includes:

**Fixed Costs**

- Retrofitting of physical facilities
- Hardware and networking
- Software
- Upgrades and replacement (in about five years)

**Variable or Recurrent costs**

- Professional development
- Connectivity, including Internet access and telephone time
- Maintenance and support, including utilities and supplies

In order to determine cost efficiencies, fixed costs must be distinguished from variable costs, and the balance between the two understood. If the fixed costs of a technology project are high and its variable costs are low, then there will be cost
advantages to scaling up. Open and distance learning institutions have also achieved cost-effectiveness through economies of scale.

4.10.3 Equity of access to ICTs in education: Given the wide disparities in access to ICTs between rich and poor countries and between different groups within countries, there are serious concerns that the use of ICTs in education will widen existing divisions drawn along economic, social, cultural, geographic, and gender lines. Ideally, one wishes for equal opportunity to participate. But access for different actors—both as users and producers—is weighted by their resources. Hence, initial differences are often reproduced, reinforced, and even magnified, formidable challenge, therefore, continues to face planners of international education: how to define the problem and provide assistance for development.\textsuperscript{xvii}

The introduction of ICTs in education, when done without careful deliberation, can result in the further marginalization of those who are already underserved and/or disadvantaged. Women have less access to ICTs and fewer opportunities for ICT-related training compared to men because of illiteracy and lack of education, lack of time, lack of mobility, and poverty.\textsuperscript{xviii} Boys are more likely than girls to have access to computers in school and at home. Not surprisingly, boys tend to enjoy working with computers more often than girls.\textsuperscript{xix} As the American Association of University Women reports, “Girls have narrowed some significant gender gaps, but technology is even now the new ‘boys’ club’ in our nation’s public schools. While boys programme and problem solve with computers, girls use computers for word processing…”\textsuperscript{xx}

In an evaluation of its programme in four African countries, Worldlinks, an organization that promotes project-based, international tele collaboration activities among secondary school teachers and students from developing countries, it was found that despite efforts to make the programme gender neutral, gender inequalities in access persist. Furthermore, while girls benefited more from the programme in terms of improved academic performance and communication skills, boys were able to hone their technological skills more. Thus a complex of economic, organizational, and socio-cultural factors account for these differences in these societies.

“High student-to-computer ratios and first come first serve policies do not favour girls, since girls have earlier curfew hours and domestic chore responsibilities
which limit their access time, and local patriarchal beliefs tend to allow boys to dominate the computer lab environment.”

Measures proposed to address this gender bias include encouraging schools to develop “fair use” policies in computer labs, conducting gender sensitivity sessions, and advocating for reducing the after-school duties of girls to give them more time to use the computer lab. Girls also need to have female role models to inspire them to participate in technology-related activities.

Providing access to ICTs is only one facet of efforts to address equity issues. Equal attention must be paid to ensuring that the technology is actually being used by the target learners and in ways that truly serve their needs.

4.10.4 Sustainability of ICT-enhanced educational projects: One aspect of development programs that is often neglected is sustainability. The long history of development aid has shown that too many projects and programs start but miserably failed to maintain the momentum. This is true for many ICT-based educational projects as well. In many instances, these projects are initiated by third party donors and not enough attention is paid to establishing a mechanism by which the educational institution or community involved can pursue the project on its own or in partnership with other stakeholders after the initiating donor exits. Thus cost and financing are not the only barriers to sustainability. The sustainability of ICT-enabled programs has four components: social, political, technological, and economic.

Economic sustainability - refers to the ability of a school and community to finance an ICT-enabled programme over the long term. Cost-effectiveness is key, as technology investments typically run high and in many cases divert funds from other equally pressing needs. Planners should look to the total cost of ownership and build lucrative partnerships with the community to be able to defray all expenses over the long term. The need to develop multiple channels of financing through community participation ties economic sustainability closely to social and political sustainability.

Social sustainability - is a function of community involvement. The school does not exist in a vacuum, and for an ICT-enabled project to succeed the buy-in of parents, political leaders, business leaders and other stakeholders is essential. Innovation can happen only when all those who will be affected by it, whether directly or indirectly, know exactly why such an innovation is being introduced, what the implications are
on their lives, and what part they can play in ensuring its success. ICT-enabled programs must ultimately serve the needs of the community. Thus community-wide consultation and mobilization are processes critical to sustainability. In short, a sense of ownership for the project must be developed among all stakeholders for sustainability to be achieved.

**Political sustainability** - refers to issues of policy and leadership. One of the biggest threats to ICT enabled projects is resistance to change. If teachers refuse to use ICTs in their classrooms, then use of ICTs can hardly take off, much less be sustained over the long term. Because of the innovative nature of ICT-enabled projects, leaders must have a keen understanding of the innovation process, identify the corresponding requirements for successful adoption, and harmonize plans and actions accordingly.

**Technological sustainability involves** - choosing technology that will be effective over the long term. In a rapidly changing technology environment, this becomes a particularly tricky issue as planners must contend with the threat of technological obsolescence. The rule of thumb in this context is to let the learning objectives drive the technology choice and not vice versa. When making technology decisions, planners should also factor in not just costs but also the availability of spare parts and technical support.

### 4.11 Challenges in Integrating ICTs in Education

Although valuable lessons may be learned from best practices around the world, there is no one formula for determining the optimal level of ICT integration in the educational system. Significant challenges that policymakers and planners, educators, education administrators, and other stakeholders need to consider include educational policy and planning, infrastructure, language and content, capacity building, and financing.

#### 4.11.1 Teacher-level challenges or barriers

Usually the most the most important challenge or barrier for the implementation of the ICT comes from the side of teachers and schools management or from those who are responsible for its execution. Following are the major issues or barriers.
• lack of time — for training and self-directed exploration, and for preparing ICT resources for lessons and also the lack of self-confidence in using ICT

• negative experiences with ICT in the past

• fear of embarrassment in front of pupils and colleagues, loss of status and an effective degrading of professional skills

• classroom management difficulties when using ICT, especially where pupil-to-computer ratios are poor

• lack of the knowledge necessary to enable teachers to resolve technical problems when they occur

• lack of personal change management skills

• perception that technology does not enhance learning

• lack of motivation to change long-standing pedagogical practices

• perception of computers as complicated and difficult to use.

4.11.2 School-level challenges or barriers

• lack of ICT equipment and the cost of acquiring, using and maintaining ICT resources

• lack of access to ICT equipment due to organizational factors such as the deployment of computers in ICT suites rather than classrooms

• obsolescence of software and hardware

• unreliability of equipment

• lack of technical support

• lack of administrative support

• lack of institutional support through leadership, planning and the involvement of teachers as well as managers in implementing change

• lack of training differentiated according to teachers’ existing ICT skill levels

• lack of training focusing on integrating technology in the classroom rather than simply teaching basic skills.
4.11.3 Infrastructure-related challenges

- availability of appropriate rooms/buildings available to house the technology
- availability of electricity and telephony
- different types of ICT in a country in general, and in educational system in particular

4.11.4 Capacity-building Challenges

Various competencies must be developed in the system for successful integration of ICT.

**Teachers** - Teacher professional development should have five focus areas.

- skills with particular applications
- integration into existing curricula
- curricular changes related to the use of IT (including instructional design)
- changes in teacher role; and
- underpinning educational theories

Ideally, these should be addressed in pre-service teacher training and built on and enhanced in-service. Research on the use of ICTs in different educational settings over the years; invariably identified the inability of the teacher to understand why they should use ICTs and how exactly they should use ICTs to help them teach better as a barrier. Teacher anxiety over being replaced by technology or losing their authority in the classroom as the learning process becomes more learner-centered—an acknowledged barrier to ICT adoption—can be alleviated only if teachers have a keen understanding and appreciation of their changing role.

**Education administrators** - Leadership plays a key role in ICT integration in education. Many teacher- or student-initiated ICT projects have been undermined by lack of support from above. For ICT integration programs to be effective and sustainable, administrators themselves must be competent in the use of the technology, and they must have a broad understanding of the technical, curricular, administrative, financial, and social dimensions of ICT use in education.
**Technical support specialists** - Whether provided by in-school staff or external service providers, or both, technical support specialists are essential to the continued viability of ICT use in a given school. While the technical support requirements of an institution depends ultimately on what and how technology is deployed and used, general competencies that are required should be developed.

**Content developers** - Content development is a critical area that is too often overlooked. The bulk of existing ICT-based educational material is likely to be in English or of little relevance to education in developing countries (especially at the primary and secondary levels). There is a need to develop original educational content adapt existing content, and convert print-based content to digital media. These are tasks for which content development specialists such as instructional designers, scriptwriters, audio and video production specialists, programmers, multimedia course authors, and web-developers are needed. Like technical support specialists, content developers are highly skilled professionals historically employed by primary and secondary schools. Many universities with distance education programs, and those who otherwise make use of ICTs, have dedicated technical support and content development units.

**4.11.5 Challenge in the form of language and content**

   English is the dominant language of the Internet. An estimated 80% of online content is in English. A large proportion of the educational software produced in the world market is in English. For developing countries in the Asia-Pacific where English language proficiency is not high, especially outside metropolitan areas, this represents a serious barrier to maximizing the educational benefits of the World Wide Web. Even in countries where English is a second language it is imperative that teaching and learning materials that match national curriculum requirements and have locally meaningful content, preferably in the local languages, be developed. This would ensure that the Web is a genuinely multicultural space and that peoples of different cultures have an equal stake and voice in the global communities of learning and practice online.

   Particularly vulnerable to exclusion of this sort are isolated, rural populations, cultural minorities, and women in general. Thus attention must be paid to their special needs. One encouraging trend has been the emergence of national and regional school
networks, or School Nets, that facilitate the sharing of content and information—curriculum guides, teaching and learning resources, school and teacher directories, training curricula and materials, research and policy papers, technology management guides, and start-up toolkits, among others.

In Web-based learning, technical standardization of content has also become a pressing issue. Standardization allows different applications to share content and learning systems. Specifications in content, structure, and test formats are proposed so that interoperability may exist between different management systems, resulting in some cost-efficiencies. Standards must be general enough to support all kinds of learning systems and content.

4.11.6 Challenges related to financing the ICT use

One of the greatest challenges in ICT use in education is balancing educational goals with economic realities. ICTs in education programs require large capital investments and developing countries need to be prudent in making decisions about what models of ICT use will be introduced and to be conscious of maintaining economies of scale. Ultimately it is an issue of whether the value added of ICT use offsets the cost, relative to the cost of alternatives.

Following are the potential sources of money and resources for ICT use programs: Grants, Public subsidies, 3. Private donations and fund-raising events, Community support (e.g. rent-free building), and Membership fees. Revenue can be earned from core business of connectivity, direct computer access to users, and office services (photocopying, scanning, audiovisual aids. Revenue can also be earned from ancillary activities like business services (word-processing, spreadsheets, budget preparation, printing, and reception services), educational services (distant education, training courses) community services (meeting rooms, social events, local information, remittances from migrant workers), telework and consulting, specialized activities (telemedicine), and sales (stationary, stamps, refreshments, etc.).

4.12 Private Public Partnership

Private sector - public sector partnerships to either pilot or fast track ICT-based projects is a strategy that has gained currency among Ministries of Education in developing countries. These partnerships take many forms, including private sector grants with government counterpart contributions, donations of equipment and
education-related content by corporations to state-run schools, and the provision of technical assistance for planning, management, and strengthening human resources at the grassroots level. Multilateral organizations and international aid agencies have also driven many of the most significant ICT in education efforts in the developing world. But the financial litmus test of ICT-based programs is survival after donor money has run out. Many ICT based education programs funded by aid agencies or by corporations could not be sustained because government failed to step in with the necessary financing; nor were the local communities in a position to generate the resources needed to continue these programs.

4.13 Kerala Education Sector – Current status

Kerala has always upheld social development over mere economic growth. The quality of life of the people, be it in education and awareness or in health and well-being, has been the main thrust of Government policy over the years. “Development with care and compassion” is the vision with which the Government is planning and prioritizing schemes in the XIIth Plan period. The quality of human capital is much higher than elsewhere in the country and comparable in many ways to advanced nations. But now days we are finding it difficult to sustain this Kerala Model of development given the limited resources, increasing aspirations and the changing demographic profile of the state. Another major problem is the high inequality that exists in Kerala between communities and regions, which calls for well targeted interventions to ensure that the vulnerable sections of the population also enjoy the benefits of development. xiv

Educational achievement

The educational achievement of the state is the prime factor behind its present well-being and the “Kerala Model of Development”, which is highly lauded. Our State is far ahead of the national objectives in the Primary and Secondary education and is striving for attaining international standards in Higher education, Technical education and Research. As per the new strategy, to achieve the objectives of quality and access and excellence in Higher Education, Government of India is enhancing the role of private sector by encouraging them to establish larger and higher quality institutions by integrating technology with other strategies. In this changed scenario, the State authorities are planning to maximize access to central schemes and plan
resources to achieve their objectives. In this a review of the current status of education sector is relevant.

**Expenditure on Education**

Table 4.3

*Plan Outlay & Expenditure during XIth Plan and Annual Plans 2012-13 (र in crore)*

<table>
<thead>
<tr>
<th>Stages</th>
<th>XI th Plan Average</th>
<th>2012-13 Annual Plan</th>
<th>2013-14 Annual Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Outlay</td>
<td>Exp.</td>
<td>Per cent of Exp.</td>
</tr>
<tr>
<td>1. School Education</td>
<td>142.36</td>
<td>129.67</td>
<td>91.09</td>
</tr>
<tr>
<td>2. Higher Education</td>
<td>69.04</td>
<td>88.58</td>
<td>128.30</td>
</tr>
<tr>
<td>General Education</td>
<td>211.4</td>
<td>218.25</td>
<td>103.24</td>
</tr>
<tr>
<td>3. Technical Education</td>
<td>53.62</td>
<td>76.79</td>
<td>143.21</td>
</tr>
<tr>
<td>Total</td>
<td>265.02</td>
<td>295.04</td>
<td>111.33</td>
</tr>
</tbody>
</table>

Source – Economic Survey 2013

During the first year of the XIIth Plan an amount of 590.24 crore had been earmarked for Education sector of which 98.78 per cent was expended. In the total outlay 48.6 per cent was earmarked for the school education, 34.2 per cent for higher education and 17.12 per cent for technical education. The average total outlay of XIth Plan was 265.02 crore in which 53.7 per cent was earmarked for the school education, 26 per cent for higher education and 20.23 per cent for technical education. The percentage allocation for general education has increased to 82.87 in 2012-13 and 83.14 in 2013-14 compared to the average allocation of 79.76 for the same during the XIth plan. The percentage allocation for school education in the Annual Plan 2013-14(47.66) and 2012-13 (48.65) has been decreased considerably from that of the average outlay of XIth Plan (53.71). This may be due to the fact that the state had achieved most of the targets in school education. During 2013-14 29.54 per cent of the allocation has expended up to 30.11.2013.
Literacy

Kerala ranks first in the country with a literacy rate of 93.91 per cent closely followed by Lakshadweep (92 per cent) and Mizoram (91.58 per cent). Kerala’s literacy rate is comparable to the most advanced regions of the world. The male, female literacy gap which was 22 per cent in 1951 has narrowed down to 4.04 per cent in 2011. Kerala holds the first rank in the country in female literacy (92%).

District wise analysis of Kerala’s literacy rate shows that Pathanamthitta district with 96.93 % has the highest literacy rate in the state followed by Kottayam with 96.40 % and Alappuzha with 96.26 %. Palakkad district has the lowest literacy rate in the state (88.49 per cent). The low rate of literacy of the Palakkad district may be due to the prevalence of substantial percentage of SC and ST population whose literacy rates are below the state average.

Elementary Education

There were 12627 schools in Kerala during 2012-13. Out of these 4619 (36.58 per cent) were government schools, 7152 (56.64 per cent) aided schools and 856 (6.78 per cent) unaided schools. Compared to government upper primary and high schools more number of Lower Primary schools are functioning under government sector. Aided schools outnumber government schools in all sections.

Management wise share of schools in the State

![Management wise share of schools in the State](image)

Source: Directorate of Public Instructions

*Figure 4.1: Management wise share of schools in the State*
994 schools in the state are offering syllabus other than the one prescribed by the state Government. These include 842 CBSE schools, 108 ICSE schools, 30 KendriyaVidhyalaya and 14 JawaharNavodayas. One JawaharNavodayaVidhyalaya school each is functioning in all the districts.

Physical Infrastructure and Facilities in Government Schools

All the Government Schools in Kerala are functioning in pucca buildings. Local Self Government Institutions and programmes like SarvaShikshaAbhiyan (SSA) have contributed much to the overall development and improvement of physical infrastructure and common facilities in government schools in the state. Data shows that 98.76 per cent of government schools have access to drinking water and 99.6 per cent have urinals/latrine facilities.

Enrolment of Students

Enrolment of students in the state has been showing a decline in the recent years. Change in demographic pattern of the state due to low birth rate is the main reason attributed for this phenomenon. The decline of students in LP section is 44221 numbers in 2013-14 compared to the previous year. While the decline in Upper Primary (UP) section is 57012 numbers in 2013-14, and the High School (HS) section shows a decrease of 18789 students over the previous year. The decrease in the enrolment of students is shown in Figure 4.2.

Enrollment of Students

Source: Directorate of Public Instructions

*Figure 4.2: Enrollment of Students*
**Enrolment of Girl students**

Girl students constitute 49.44 per cent of the total student enrolment in schools. Boys outnumbered girl students in all the districts except Thiruvananthapuram and Pathanamthitta. Generally, in Kerala there is a more or less uniform pattern in the enrolment of girl students across districts.

**Strength of SC, ST Students**

As per the figures of 2013-14, SC students constitute 11.28 per cent of total students in the state. The percentage of SC students in government schools, private aided schools and private unaided schools are 14.06 per cent, 11.04 per cent and 3.93 per cent respectively. ST students constitute 1.98 per cent of total enrolment in schools in the year 2013-14. The percentage of ST students in government schools, private aided schools and private unaided schools are 3.71 per cent, 1.36 per cent and 0.32 per cent respectively in 2013-14.

**Drop-out rate**

Kerala has achieved the distinction of having the lowest dropout rate of school students among the Indian states. In the year 2011-12, dropout ratio among school students in Kerala was 1.05 per cent. The dropout ratio in Lower Primary stage is higher than that of HS/UP stage. The dropout ratio is almost same in UP stage and High school stage. Among the Districts, Thiruvananthapuram has the highest dropout ratio in the lower primary section (4.87 per cent), and upper primary section (2.15 per cent). In the case of high school section Wayanad has the highest drop-out ratio (2.51 per cent).

**Number of Teachers**

The number of school teachers in Kerala including Teachers Training Institute (TTI) teachers during 2012-13 was 167776. Out of this 101143 (60.28 per cent) teachers are working in aided schools and 13052 (7.78 per cent) teachers are working in private unaided schools. The remaining 31.94 per cent of teachers are working in government schools. 51.61 per cent of total teachers in the state are teaching in high schools, 24.63 per cent in upper primary schools, 23.29 per cent in lower primary schools and the remaining (0.47 per cent) in TTI’s. 71.65 per cent of total teachers in the state are women.
Sarva Shiksha Abhiyan (SSA)

The Sarva Shiksha Abhiyaan was introduced in 2000-2001 as the flagship programme by the Government of India. This scheme is framed to provide useful and relevant elementary education for all children in the age group of 6 to 14 by 2010 irrespective of any social, regional, economic and gender barriers, with the active participation of the community in the management schools. It encompasses all activities of school education—providing physical infrastructure, free text book for children, encouraging enrolment of girls and teacher training. The fund sharing between the central and the states was 75:25 in the Tenth Plan. The funding pattern for the Eleventh Plan was modified to 65:35. The implementation of the programme to the real essence is extra emphasized in the event of the constitution of the Right to Education Act in the country.

Table 4.4

*Outlay and Expenditure of Sarva Shiksha Abhiyan*

<table>
<thead>
<tr>
<th>Year/Category of Students</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Enrolment Ratio(GER)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010-2011</td>
<td>104.00</td>
<td>103.00</td>
</tr>
<tr>
<td>2011-2012</td>
<td>103.00</td>
<td>102.06</td>
</tr>
<tr>
<td>2012-2013</td>
<td>102.00</td>
<td>102.00</td>
</tr>
<tr>
<td>Net Enrolment Ratio(NER)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010-2011</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2011-2012</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2012-2013</td>
<td>99.00</td>
<td>100</td>
</tr>
<tr>
<td>Drop Out Rate (Class I to VIII)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010-2011</td>
<td>0.27</td>
<td>0.28</td>
</tr>
<tr>
<td>2011-2012</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>2012-2013</td>
<td>0.02</td>
<td>0.01</td>
</tr>
<tr>
<td>Completion Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010-2011</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2011-2012</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2012-2013</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Sarva Shiksha Abhiyaan, Kerala
Higher Secondary Education

Education after the first 10 years was a part of the higher education system for many decades. Higher Secondary courses were introduced in the state during 1990-91 to reorganize the secondary level of education in accordance with National Education Policy. Higher Secondary Course is the turning point in the entire school education in our state. 1825 Higher Secondary schools were there in 2013 in the state. Out of these 776 (42.52 per cent) are Government schools, 674 (36.93 per cent) are Aided schools and the remaining 375 (20.55 per cent) are Unaided and technical schools. Among the districts Kozhikkode has the largest number of Higher Secondary schools (225 nos) in the state followed by Thrissur (177 nos) district. There are 6264 batches for higher secondary courses in 2013. The total number of enrolment of students in Higher Secondary Schools was 355797 and it registered an increase of 7.92 per cent over the previous year. Kozhikkode district had the largest no of batches (853nos) with an enrolment capacity of 49399 students.

Vocational Higher Secondary Education

Vocational Higher Secondary Education was introduced in the state in 1983-84. Vocational Higher Secondary Education in the state imparts education at plus two levels with the objective to achieve self/wages/direct employment as well as vertical mobility. 389 Vocational Higher Secondary Schools are there in the state with a total of 1097 batches. Out of these Schools 261 are in the Government sector and 128 in the Aided sector. Kollam District (52 nos) has the largest number of Vocational Higher Secondary Schools in the state.

4.14 IT @ School Project

4.14.1 Background

The National Policy on Education 1986, as modified in 1992, stressed the need to employ educational technology to improve the quality of education. The policy statement led to two major centrally sponsored schemes, namely, Educational Technology (ET) and Computer Literacy and Studies in Schools (CLASS) paving the way for a more comprehensive centrally sponsored scheme – Information and Communication Technology @ Schools. Educational technology also found a significant place in various scheme on upgradation of science education. The
significant role ICT can play in school education has also been highlighted in the National Curriculum Framework (NCF) 2005. Use of ICT for quality improvement also figures in Government of India's flagship programme on education, Sarva Shiksha Abhiyan (SSA). Again, ICT has figured comprehensively in the norm of schooling recommended by the Central Advisory Board of Education (CABE), in its report on Universal Secondary Education, in 2005.

With the convergence of technologies, it has become imperative to take a comprehensive look at all possible information and communication technologies for improving school education in the country. The comprehensive choice of ICT for holistic development of education can be built only on a sound policy. The initiative of ICT Policy in School Education is inspired by the tremendous potential of ICT for enhancing outreach and improving quality of education. The initiative has the following objectives.

- an environment to develop a community knowledgeable about ICT
- an ICT literate community which can deploy, utilize, benefit from ICT and contribute to nation building
- an environment of collaboration, cooperation and sharing, conducive to the creation of a demand for optimal utilisation of and optimum returns on the potentials of ICT in education

With the above stated objectives central government is promoting:

- universal, equitable, open and free access to a state of the art ICT and ICT enabled tools and resources to all students and teachers
- development of local and localized quality content and to enable students and teachers to partner in the development and critical use of shared digital resources
- development of professional networks of teachers, resource persons and schools to catalyze and support resource sharing, upgradation, and continuing education of teachers
- guidance, counseling and academic support to students, resource sharing, and
management and networking of school managers and administrators, resulting in improved efficiencies in the schooling process.

In line with the national policy on education and various other policy formulation strategies, Government of Kerala initiated an ICT project in School, namely, IT @ School project, which is one of the most acclaimed project of Kerala and well appreciated by the various national and international organizations and policy makers.

4.14.2 Mission of the Project

The IT @ School Project, is an Information Technology project under the Department of General Education, Government of Kerala in India. Launched in 2001, the Project has remodeled conventional teaching methodologies in classrooms through the use of ICT. The project is being implemented in over 12,000 schools in the State of Kerala, and also in schools in Mahé, Lakshadweep and the Middle East which follow the State syllabus. An estimated 5 million students and 200,000 teachers are now part of this project, which has a network of 160 Master Trainers and 5600 School IT Co-ordinators statewide, who are school teachers themselves. The project also conducts specialized training for visually challenged teachers in the State. The Project functions on Free Software platform.

Through elaborate Capacity Building processes, the Project aims to empower the existing teachers in schools to use the various facets of Information and Communication Technology as an educational tool. As many as 2 Lakh teachers have been given trainings as part of the Project’s initiatives. The initial years of the Project was focused more towards imparting various IT based training programmes and now the scope has elaborated to enable them to handle their subjects using ICT as a tool.

Through infrastructure upgradation, IT@School Project is putting in place a system for the proper supply of computers and accessories to schools and to uplift the school as a self sustaining unit with regard to ICT enabled education. The Project has provided computers, its accessories, broadband internet connectivity to all government schools and detailed usage norms were also issued to all schools to ensure safe and secure browsing. Laptops and Multimedia Projectors were supplied to all schools for shifting the IT based teaching and trainings to the class rooms. ‘Hardware Clinics’ were conducted in all schools to repair or upgrade damaged
computers at schools. For developing the content IT@School is offering several educational softwares like Dr. Geo, Rasmol, K-Tech lab, Geogebra, Chemtool, Kalcium etc. All these packages are being extensively customised by the teachers themselves for facilitating complete ICT enabled teaching and learning. The Project has also prepared interactive multimedia CDs, Handbooks & training modules for ICT, as well as text books for IT in standard 5 to 10. All the content developed by the Project is strictly as per the new curriculum approach (NCF). The ‘Schoolwiki’ project is launched with the goal of facilitating collaborative data collection and sharing, that too in local language. School IT Fests, IT Awards to schools etc are other programmes for motivating the schools.

IT@School is also the nodal agency for e-Governance activities in General Education Department and implemented several e-Gov programmes like Single Window System for plus-one admission, noon meal computerization, text Book Distribution computerization, transfer and Posting computerization, etc. IT@School project runs an exclusive educational channel called ‘ViCTERS’ (Virtual Classroom Technology on Edusat for Rural Schools) for making the learning more interactive and participatory.

4.14.3 The Project through the years – Timeline of the Project

2001 – IT@School Project was established and IT campaigns conducted statewide.
2002 – Network of Master Trainers and School IT Co-ordinates were formed and Teacher empowerment programmes started.
2003 – IT became a Compulsory subject in State Curriculum, with IT practical exams.
2004 – District Resource Centers were setup and IT enabled contents developed.
2005 – IT@School Linux developed and EDUSAT ViCTERS network was launched.
2006 – Complete shift to Free Software, Handbooks and supplements developed.
2007 – IT practical exam were conducted entirely on FOSS.
2008 – (1) Broadband connectivity was provided to all schools in the state.
        (2) Piloting of ICT enabled education from IT education commenced.
ICT and Education

(3) Laptops were issued to all schools in the state.
(4) IT@School was selected as the nodal agency for all e-governance.

2009 –
(1) The shift to ICT enabled education was at pace.
(2) ViCTERS educational channel was made available in local cable networks.
(3) Electrification of classrooms was initiated by the Project.
(4) IT@School Project was expanded to Upper Primary and Hr. Sec. Schools.

2010 –
(1) Complete implementation of ICT enabled education in the state started.
(2) School Wiki was launched by the Project.
(3) Model ICT schools with Smart Classrooms were started statewide.
(4) Training for 28,000 School student IT Co-coordinators was undertaken.

4.14.4 Major Programs of the IT @School

- **VICTERS**

  IT@School is the nodal agency for implementing EDUSAT network and runs an exclusive channel for education called VICTERS (Versatile ICT Enabled Resource for Students), which is now aired for 17 hours a day. VICTERS offers interactive virtual classrooms that enable the school students as well as the teachers to directly communicate with the subject experts and educationists. It also ensures the dissemination of high quality education to the students and teachers from the original source. Various programmes telecast through VICTERS are as follows.

  - Padanakauthukam, Shastrakauthukam educational programmes
  - Examination oriented programme for SSLC and Plus 2 level
  - Shasthramuthukal (Science programmes).
  - Vazhikaatti (produced by State Institute of Educational Technology)
  - Ormayile Malayalam (Specific date-wise regional programme)
  - Kerala Sree (Produced by Dept. of Information & Public Relations, GOK)
  - Deutsche Welle Time (DW Programme)
  - Pusthakangalkkoppam (Introducing various Books)
  - HarithaVidhyalayam (Educational reality show for schools)
  - KadhaparayumNeram (Story telling time)
Mozhimuthukal (Detailing famous quotes)

Drishyapaadam (produced by State Open School)

Naadavismayam (Introducing Musical instruments and symphonies)

Innalekalile Innu (Yesterday - Today)

IT for All (Technology outlook programme for students and public)

Tomorrow Today (DW Programme)

Beyond the text (text based programme)

Global Three Thousand (DW Programme)

Magic fingers (tricks and plays on magic)

**ANTS (ANimation Training programme for Students)**

The Project is engaged in giving training in Animation movie making skills entirely based on Free and Open Source Software such as KToon, Gimp, OpenShot Video Editor and Audacity.

**Other Training programmes**

Various training programs were conducted by the IT @ school as part of the ICT enabled education program in the state. The most important feature of is that they consistently used free software for their programs and also popularized the same among the masses.

- **ICT training**: Training given to familiarise the basics of Operating Systems and office packages and other application software

- **Hardware Training**: 3 day training programme on hardware maintenance and basic support

- **Internet Training**: 20 hour training programme was given to all SITCs and interested school teachers. The trained SITC then trained all High School teachers in their school. Government has also issued strict instructions that every student in Std X in the school should get at least 10 hours of internet exposure per year.

- **IT Training for the visually challenged**: In association with Insight scheme of Kerala State IT Mission, the Project has successfully imparted IT training
using free software for teachers of special schools for visually challenged, by exclusively using free software based screen reading software named ORCA.

- **Camera handling training**: Training on camera handling to the teachers, enabling them to create educational videos which could be beneficial in implementing ICT enabled education

- **Training on ICT enabled content**: Specific training on ICT enabled content to teachers so as to enable them to use ICT enabled content in all subjects in order to equip teachers in classroom transaction

**Content Development**

IT@School Project has rolled out several programmes which included the development of its own Operating System - IT@School GNU/Linux- which is now being used in all the schools in the state. Apart from this, several educational software like Dr. Geo, Rasmol, K-Tech lab, Geogebra, Chemtool, Kalzium etc. are being extensively customized by the Project in developing teacher friendly applications for facilitating complete ICT enabled education in the state. The Project has also prepared interactive multimedia CDs, Handbooks & Training modules for ICT, as well as Text books for IT in standard 8, 9 and 10. The content developed by the Project is strictly as per the new curriculum approach based on the National Curriculum Framework 2005. The Project has also associated with Intel Skool for collaborative content development programmeshttp://kerala.skool.in . The Project has also developed contents for Upper Primary classes – for 5-7 classes and the same has been given to all schools. To add with this, the Project had developed E-Text books for Std 8 to 10

**Free Open Source Software (FOSS) initiatives**

The free software applications developed or customized by the Project include the following.

1. Application software-Open office, GIMP, Dr. Geo, Rasmol, KEduca, Klab etc.
2. Examination software –to conduct IT practical examination to more than 1.6 million students
3. Handbook for GNU\Linux – prepared as a user manual for working in IT@School GNU\Linux
4. Training modules in GNU\Linux – to train teachers in open source
5. Textbook for standard 8th 9th and 10th – Prepared in association with SCERT
6. ICT training programme based on Free and Open Source Software (FOSS) for students who require special attention
7. ICT training to all visually challenged teachers in the State using the free software – ORCA

Public Awareness programme

The project is also engaged in organizing State-wide awareness campaigns to expose the possibilities and advantages of using Linux-based software. Resource persons of the IT@School Project in these sessions, demonstrate how there is a free software alternative to each and every computer application that an average user requires on a daily basis.

E-education governance

IT@ School Project has implemented several E-Governance initiatives in the state. The major e-governance initiatives are the Single Window admission system for Plus One admissions and the Online Transfer and Posting of technical assistance to teachers. The online transfer and posting of teachers gains more advantage as it benefits over 60,000 teachers in the state. Some of the other e-governance initiatives of the Project include the Noon meal distribution computerization, Youth festival software, Pre-metric scholarship online, Centralized Online Text Book Intend system, Implementation of SPARK (Service Payroll Administrative Repository for Kerala) within General Education department and the Total Physical Fitness Programme software etc.

Total Physical Fitness Programme software

Completely digitized software on Total Physical Fitness Programme wherein details of 30 lakh students are available for further action.

Schoolwiki

‘School Wiki’—modeled on the Wikipedia—attempts to foster the culture of collaborative learning in Kerala’s schools. The portal named www.schoolwiki.in provides a comprehensive knowledge database of all schools in the state. The innovative portal includes the learning outcomes of students derived from group activities as well as various educational contents prepared by the teacher groups. This
collaborative website is completely Prepared in Malayalam All High Schools in the state include their educational contents and other details in their allotted space. Each school would be able to enter details such as basic elementary data, their historical references, statistics, infrastructure details, details of alumni, school websites and blogs, various clubs and forums, class magazines, supporting images and videos. Apart from these contents, analytical language projects such as “PradeshiKapatram – [School Newsletter]”, “NadodiVijnanakosham – [Local Encyclopedia]” and “Ente Nadu- [My Village]”, are part of learning Malayalam language.

As a result of the various initiative of IT@ School project, every student studying in the government schools/Aided schools in the state enjoys the most of the educational facilities, irrespective of his/her background. The basic concept of choosing the teachers themselves as the trainers was developed to build their confidence levels and to empower them for handling their subjects using ICT as a tool. The project works entirely on FOSS and it is considered to be the single largest simultaneous deployment of FOSS based ICT education in the world. The combination of the features of the integrated model followed by IT@ School programme can be summarized as integrating ICTs with regular school processes, investing in teacher capacity building, moving beyond computer literacy to computer aided learning and use of FOSS platforms.

4.14.5 Impacts of IT@ School project

Wide spread implementation of the Information and Communication Technologies in education have enabled the convergence of a wide array of technology based and technology mediated resources for teaching-learning. It has therefore become possible to employ ICT as an omnibus support system for education. The potential of ICT to effectively respond to the various challenges posed by the education system can be understood from the following.

- IT@School was very successful to disseminate information about and catalyze adaptation, adoption, translation and distribution of sparse educational resources distributed across various media and forms, which has helped in its widespread availability and extensive use.
ICT and Education

- IT @School with the help of ICT tools led to digitization of contents and made it available in the form of educational audio and video resources, which existed in different languages, media standards and formats.

- Given the scarcity of print resources as well as web content in Indian languages, expertise of IT @school, was gainfully employed for digitizing and disseminating existing print resources like books, documents, handouts, charts and posters, which have been used extensively in the school system, in order to enhance its reach and use.

- ICT effectively addressed teacher capacity building programs and also strengthened the school system's ability to manage and improve efficiencies, which was difficult to address due to the size of the school system and the limited reach of conventional methods of training and support.

- Using computers and the Internet as mere information delivery devices grossly underutilizes its power and capabilities. ICT plans and programs introduced/developed and deployed a large variety of applications, software tools, media and interactive devices in order to promote creative, aesthetic, analytical and problem solving abilities and sensitivities in students and teachers.

Effectiveness of ICT enabled teaching - learning processes

ICT enabled teaching-learning through IT@School project, encompasses a variety of techniques, tools, content and resources aimed at improving the quality and efficiency of the teaching learning process. Ranging from projecting media to support a lesson, to multimedia self-learning modules, to simulations to virtual learning environments, there are a variety of options available to the teacher to utilise various ICT tools for effective pedagogy. Each such device or strategy led to changes in the classroom environment, and its bearing on effectiveness. It transformed the classrooms into ICT Enabled classrooms. Teachers are participating in the selection and critical evaluation of digital content and resources. They are also developing their own digital resources, sharing them with colleagues through the digital repositories. In schools equipped with EDUSAT terminals, DTH or other media devices, relevant activities are well planned and incorporated into the time schedule of the school. Initially the teachers used the Computer lab for teaching-learning but now more classrooms are equipped with appropriate ICTs, making way for ICT Enabled classes.
ICT Infrastructure

IT @School effectively introduced the infrastructure needed for the implementation of ICT in schools. It was a haunting task for the project to introduce the following infra-structure, and they performed it well.

**Hardware:** IT @School with government’s active support established state of the art, appropriate, cost effective and adequate ICT infrastructure in almost all government schools. At least one printer, scanner, projector, digital camera, audio recorders and such other devices were provided as part of the infrastructure development. Each school is equipped with computer laboratory with networked computer access points. In addition, classrooms are also equipped with appropriate audio-visual facilities to support an ICT enabled teaching-learning. Steps are also initiated for supplying appropriate hardware for Satellite terminals. Computer access points with internet connectivity is provided in the library, teachers’ common room and the school head’s office to realize the objectives of automated school management and professional development activities. Many schools are also having 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. These facilities enabled a significant enhancement of education and the range of classroom practices.

**Network and Connectivity:** All computers in the school are made a part of a single local area network to enable optimum sharing of resources. In addition to the laboratory, internet connections are provided at the library, teachers’ common room and the school head’s office. Each school is also serviced with broadband connectivity capable of receiving streaming audio and video, a range of digital learning resources and interactive programmes. Training to teachers and students is an ongoing process for the safe use of internet. Firewalls and other security measures are also implemented to guard the school network against cyber attacks and misuse of the ICT facilities. Government is also implementing system for the uninterrupted telecast of EDUSAT programs in schools.

**Software:** A software environment favouring pedagogy of learning which promotes active learning, participatory and collaborative practices and sharing of knowledge is introduced to nurture a creative learning environment in the schools.
Free and Open Source Software – operating system and software applications are 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 already provided to meet the demands of a broad based ICT literacy and ICT enabled teaching learning program. Graphics and animation, desktop publishing, web designing, databases, and programming tools etc are common features to increasing the range of skills and conceptual knowledge of the students and teachers. Widespread dissemination of software compilations including specialized software for different subjects, simulations, virtual laboratories, modeling and problem solving applications are available in schools.

**Enabling Infrastructure:** Regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, including alternate sources of energy, have been provided with the help of the local government agencies. Students and teachers are also being trained in the safe use of electrical outlets and fittings. Adequate safety precautions and rules for use have been established. Steps were also taken to protect the equipment and resources from theft and damage. They are covered under an appropriate insurance policy

**ICT for School Management**

IT@School is also the nodal agency for all e-governance initiatives within Department of General Education. They are encouraging schools for a makeover from traditional management techniques to an automated and ICT managed school processes. A school wide local area network enables automation of a variety of processes. Beginning with library automation, various projects like office automation, maintenance of records, student tracking, resource planning, are initiated by using the ICT infrastructure and it has increased efficiencies. At the same time, savings in cost, time and effort are also visible. This will also enhance the e-governance capacity of the state.


The Commonwealth of Learning, “An Introduction to Open and Distance Learning”; available from http://www.col.org/ODLIntro/introODL.htm


EnGauge. North Central Regional Educational Laboratory; available from http://www.ncrel.org/engauge/skills/21skills.htm


Blurton, C., “New Directions of ICT-Use in Education”, p. 21


xxiii S. Cisler, “Planning for Sustainability: How to Keep Your ICT Project Running”; available from http://www2.ctcnet.org/ctc/Cisler/sustain.doc


xxv Economic Review 2013

xxvi Wikipedia, the free encyclopedia

xxvii www.itschool.gov.in