ICTs programmes in schools in Yadgir district

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Table of contents

Acronyms

AIR	All India Radio
APF	Azim Premji Foundation
BEO	Block Education Officer
BOOT	Build-Own-Operate-Transfer (a Public Private Partnership model)
BPL	Below Poverty Level
BRC / CRC	Block Resource Centre / Cluster Resource Centre
CL	Computer Learning
CAL(P)	Computer Aided Learning (programme)
CBO	Community Based Organisations
CDF	Community Development Foundation.
DDPI	Deputy Director of Public Instruction
DIET	District Institute of Education and Training
DPEP	District Primary Education programme
DSERT	Department of State Education Research and Training
ET	Educational Technology
FGD	Focus Group Discussion
FOSS	Free and Open Source Software
GHS / GHPS	Government High School / Government Higher Primary School
HM	Headmasters
ICT	Information and Communication Technologies
KSU	Kalike Samruddhi Upakram
MDP	Management Development programme
MS	Mahiti Sindhu
NCF	National Curriculum Framework
ICTs	Information and Communication Technologies.
SDMC	School Development Monitoring Committee.
SMT	State Master Trainers
SRTT	Sir Ratan Tata Trust
SSA	Sarva Shiksha Abhiyaan

Executive summary

Sir Ratan Tata Trust (SRTT) as a part of its "Kalike Samruddhi Upakram" (KSU) program, asked IT for Change (ITfC) to conduct a study on the ICT programmes in schools in the Yadgir and Sedam blocks of Yadgir district. ITfC designed and carried out this study in close collaboration with the KSU team at Yadgir, visiting around 30 schools to study the Computer Aided Learning Program (CALP), Mahiti Sindhu (MS), ICT@Schools Phase 1 and 2 (all Computer-based learning programmes), EDUSAT (Satellite - Television based) and Keli Kali (Radio based) programmes. The study also included discussions with officials at different levels, playing different roles in the education department.

The study highlights include the following:

1. There are serious hardware (infrastructural) issues affecting all programmes, except the ICT@Schools phase 2 programme.
2. The Mahiti Sindhu, ICT@Schools and Computer Aided Learning Programme programmes are based on limited digital educational resources and focus largely on basic computer literacy and not much on computer aided learning.
3. In Mahiti Sindhu and ICT@Schools programmes, the actual computer training is conducted by a vendor faculty, who is not part of the school system. The involvement of the teacher and schools is less, since the programme focuses on direct learning of the students through computers and does not invest in teacher training. Consequently, the ownership of the programmes by schools is low.
4. Programs like EDUSAT and Keli Kali which have a centralised design and implementation are not found very relevant or useful by the teachers. EDUSAT also suffers from hardware issues.
5. In spite of the overall picture being one of very limited impact on actual teaching-learning, there are cases of teachers and schools working within programme limitations to use these tools in their teaching-learning processes and take advantage of their possibilities. There is also a strong belief amongst teachers and officials about the potential of ICTs in education, however, especially in case of computers, there is inadequate clarity on how to leverage this potential.
6. We need to factor in the pioneering nature of some of these programmes – Mahiti Sindhu began in 2001 when there was little understanding of how computers may actually aid learning. The observations of this report must hence be read as serving the need for future improvement and not as criticism of the programme administrators, many of who did their best in implementing the programme as designed, inspite of their own capacities not being built to do this job well.
7. Discussions with state level officials suggest that that the department is also aware of some of these issues and is putting mechanisms in place to address these, including shifting focus from student training through vendor faculty, to systemic in-house large scale teacher capacity building on computer literacy and computer aided learning. Such a shift has the potential for helping schools use ICTs in multiple ways for impacting teaching learning processes and outcomes, as our study1 of the Kerala IT@Schools programme suggests.

The field study, along with desk research of other ICTs in school programmes has also been used to prepare a "Plan of Action for using ICTs in schools in Yadgir district," as a part of the KSU programme.

1. Background

Sir Ratan Tata Trust (SRTT) launched the "Kalike Samruddhi Upakrama" (KSU) from October 2007 in Karnataka state towards improving quality of pre-school to high school education in Chamarajanagar and Yadgir education districts, in collaboration with the department of education, with the goals of making a visible impact on enhancing quality of education for most deprived communities and to provide insights for systemic reform. KSU would be based on a good understanding of both the current state of education at Yadgir (in terms of the schooling facilities and infrastructure, retention and learning, classroom and school environments, parent/community interactions and attitudes to schools), as well as the status and learnings from experiments with ICTs in the district. The Government of Karnataka has invested in ICTs through schemes such as Mahiti Sindhu (MS), ICT@Schools Phase 1 and 2, EDUSAT[1], Keli Kali, etc. NGOs like Azim Premji Foundation (APF) have also come forward to support the Computer Aided Learning programme (CALP). SRTT asked ITfC to study the status of the ICT programmes in Yadgir district and this report is based on the study.

1.1 Yadgir

Historically, Yadgir district is one of the most backward regions in the state of Karnataka. As per the report of the High Powered Committee (Dr. Nanjundappa committee) for "Redressal of Regional Imbalances," which looked into these regional imbalances in the state, most blocks in Gulbarga district are backward. As per the Human Development Report of the Government of Karnataka, Gulbarga is among the most backward regions in the state[2].

Agriculture and animal husbandry are the main occupations of this region. However, land holdings are small and 47.39% of the population consists of small or marginal farmers[3]. The region is arid with minimal irrigation facilities. This has led to majority of the population being economically deprived. Around half of the population have "Below Poverty Line" (BPL) cards. The lack of irrigation also leads to seasonal out-migration between the months of January and April that affects children's education. . The proportion of SC and ST communities is also relatively high, which also relates to their social marginalisation.

1.2 Educational status of Yadgir

The Yadgir Educational District consists of Shahapur, Sedam, Shorapur and Yadgir blocks[4]. There are a total of 1,231 Schools, of which 88% belong to the Department of Education. In such a backward region, education plays a very important role since it can provide opportunities for socio-economic mobility to the marginalised. Education can also bring about changes in societal attitudes. However, the reality is that the literacy rate of this region is one of the lowest in the entire state[5]. In this region, the gender disparity is also very high with about 70% of the rural women being deprived of education. Regional variations within the district can also be seen, Yadgir block has a literacy rate as low as 37.2%[6]. Although programmes like the District Primary Education programmeme (DPEP), Total Literacy Campaign, Nali Kali, etc. have been introduced, progress is slow. Reading and writing skills even at class V level are quite poor. In Sedam block

46% students still have difficulty in demonstrating their reading and writing skills. 36% students in Yadgir district do not yet know how to read and write in class II.

There are some location-specific reasons for the poor quality of education in Yadgir. As mentioned earlier, there is significant out-migration, especially from the months of January to April (examinations are held during this period). This is also the time children are made to take up seasonal work and as a result may not be promoted to the next class due to their low attendance[7]. 63% of children are in the labour force in some way or the other[8]. They are pushed out of school for various reasons like lack of basic infrastructure in schools, apathy of teachers and the SDMC, lack of meaningful education opportunities and, poverty, agriculture-based livelihoods , migration etc. The high drop out rate is a critical factor affecting education possibilities[9].

Language is also an issue in Yadgir as four different languages are spoken here; Kannada, Telugu, Urdu and Lambani. Most Government schools are Kannada as the medium of instruction with a few Urdu medium ones. Thus, the non-Kannada speaking student population has difficulties following the syllabus and the textbooks, often leading to poor performance as well.

Parents are often illiterate and survive as workers on a daily wage contracts. Thus, they do not see the value in spending time visiting the school and being part of their child's education processes. Only 55% of them have heard of the School Development Monitoring Committee (SDMC)[10]. The teacher community also faces problems like low morale, absenteeism, and inadequate professional development opportunities. The Gram Panchayat also does not provide support as required for maintaining the quality of education in the region and there is inadequate alignment amongst the different educational programmes of the department.

1.3. ICTs in Education

We are increasingly living in a digital world where Information and Communication Technologies (ICTs) are determining increasingly large aspects of our lives. The basic use of computers and Internet has become crucial for day to day living as well as for employment opportunities. It is seen as now imperative that a child should possess basic computer literacy when she graduates from school. In the rural areas especially, opportunities for computer education are low. Keeping these factors in mind, the Karnataka Government has introduced various ICT programmes in government schools. These computer education and computer based education programmes have been launched under the Education Technology Cell (ET) of the Department of State Education Research and Training (DSERT).

In Yadgir, the computer based programmes implemented are the Mahiti Sindhu, ICT Phase 1 and Phase 2 at the High School Level. At the Higher Primary level, the Computer Aided Learning programme (CALP) has been implemented which uses content supplied by the Azim Premji Foundation. Other than that, the ICT programmes that exists are the EDUSAT and the Keli Kali programmes, at the Higher Primary School (HPS) level.

3.4. Brief background to the programmes

A. General Objectives

1.To bring quality improvement in classroom transaction,
2.To make learning interesting and motivating,
3.To give students access to best teachers,
4.To ensure that hardspots are easily understood by the students[11].

B. EDUSAT

EDUSAT was launched by ISRO in 2004 as the first Indian satellite built exclusively for the education sector. The programme of transmitting educational content through this satelite is currently implemented in 885 primary schools in Gulbarga and Yadgir educational districts. It provides centralised content to schools through 'receive only terminals' (ROTs) installed at the school , which are powered through solar panels. Every day, two programmes of 30 minutes each are broadcast for students from Class III to VIII[12]. This programme covers Kannada, English, Science, Mathematics and Social Science subjects.

The schools have been provided with a teachers' hand book which provides the broadcast schedule in advance. This helps the teacher to integrate the video lesson with her class room teaching. The hand book also provides a one page hand out on each video lesson which contains the objectives of the video lesson, content of the lesson, pre broadcast and post broadcast activities that the teacher has to take up in the class room and also evaluation. All the class room teachers have been trained in the use of these video lessons in the class room teaching[13].

Specific objectives of EDUSAT programme

1.To provide online support to teachers in handling difficult concepts.

2.To create access to competent teachers and appropriate materials for all learners,

3.To develop desired learner competencies and skills in children of class-III to VII & VIII to X with respect to major concepts (hard spots) in (a) Mathematics, (b) Science, (c) Social Science, and (d) Kannada and (e) English (classes V-VIII),

4.To provide necessary inputs in non-curricular areas for the overall development of children,

5.To provide academic support to teachers in handling different concepts covered in curricular areas,

6.To encourage teachers to develop teaching learning materials and its use appropriate to the different concepts being taught in the classroom,

7.To orient the school development monitoring committee members about the need for monitoring the efforts of teachers and parents in improving the quality of primary education,

8.To bring awareness among community members at large to provide academic support to all children in their respective villages/wards through active participation to supplement the efforts of teachers in improving the quality of primary education,

9.To enable teachers to get uniform guidance from specialists in the field.

Objectives related to Teachers Training

1.To provide Orientation training to the faculty of DIETs/BRCs and CRCs in the area of pedagogy and innovative methods of teaching.

2.To orient these faculty members to monitor implementation of various activities and programmes of the department.

3.To provide direct training of class room teachers in the distance mode.

C. Keli Kali

Keli Kali is a similar centralised programme, which delivers audio content to students from classes III, IV and Vthrough All India Radio (AIR).

In 2000 – 2001, the programme started on a pilot basis for class III children and was broadcast from Dharwad and Gulbarga stations of All India Radio. In the second phase, the programme was introduced in 11 DPEP districts for class III and IV children.

In the III phase, in 2002 – 03, the programme was introduced for standards III, IV and V and was broadcast from 10 stations of All India Radio, during 11.30 AM to 12.30 PM covering nearly 50,000 primary schools and 70,00,000 children in 32 educational districts of the state[14].

Objectives of the Keli – Kali Radio lessons:

The stated objectives of the programme are as follows:

1) To break the monotony in class room transaction,
2) To motivate the child towards better learning,
3) To use popular electronic media effectively in classroom transactions,
4) To provide additional resource material for teachers,
5) To improve the quality of the child's learning,
6) To improve enrolment as it also provides some entertainment for the child,
7) To reach the maximum number of children and teachers through lessons prepared by experts in the field,
8) To make learning joyful for the child.

The teachers hand books published by DSERT contains the following details to enable the teacher to use the lessons effectively in his teaching:

1) An annual time table giving the exact date when a particular lesson will be broadcast,
2) The Objectives of each radio lesson,
3) The scope of the lesson,
4) Pre broadcast activities which the teacher can under take to motivate the children,
5) Learning points in the lesson,
6) Post broadcast activities

D. Computer Assisted Learning Centre (CALC)

In 2001, the Azim Premji Foundation (APF) set up CLCs (Community Learning Centres[15]) in 35 rural government primary schools to enhance the quality of learning of children through computer based lessons developed for the Karnataka state curriculum for grades I-VII. The

programme now covers 225 primary schools. Content based on animation and child centered interactive games are created for use in the CALCs in the subjects of Mathematics, Environmental Science, Geography, Kannada, Hindi and English[16].

E. ICT programmes in High Schools

The objectives of the ICT programmes :

1.Establish an enabling environment to promote the usage of ICTs in Schools.

2.Enhance the learning levels of Mathematics, Pure Sciences, Social Sciences, language and numerous extra-curricular activities.

3.Promote critical and analytical thinking and develop self learning

4.Enable students to acquire skills needed for the digital world for higher studies and gainful employment.

5.Build capacity in teachers to upgrade their learning and teaching skills by using ICT tools.

With respect to the computer programmes, the first programme that was launched in March 2001 was the Mahiti Sindhu in 1,000 schools across the state. This project spent nearly 210 crores during the 5 year period of 2001-02 to 2005-06. It was later extended for another five year period. The vendors for the first 5 years were NIIT, Aptech and EDUCOMP. Currently it is being outsourced to Keonics. ICT Phase 1 was the next programme initiated in 2005-06 in 480 schools followed by ICT phase 2 in 1571 Government High Schools. The implementing vendors for this project were Everonn and Educomp[17].

ICT Phase 1 was started in 2005-06 in 480 schools in Karnataka. According to this schools were given 10 Personal Computers, printer, scanner, web camera and modem. This along with Microsoft Windows operating system, some educational software and infrastructure like furniture, stationary were provided to the school. In this expenditure less then 10% has been spent on teacher training. A similar case has been seem with ICT Phase 2 where significant investment has been made on latest technology but negligible amount on teacher training.

2. The Yadgir Study

2.1. Objectives of the study

The purpose of the study was to understand the ICT programmes at the higher primary and high school levels and assess their impact on teaching learning processes and from this to arrive at a possible action plan on how ICTs could be a part of the KSU programme. Specific objectives included:

1.Understanding the situation of ICTs in Education in Yadgir and Sedam blocks in Yadgir Education district.

2.Understanding stakeholder perspectives on the programmes

3.Identifying the main issues in these programmes and analysing the underlying causes

2.2. Scope of the Study

The study aimed to understand the present status of ICT based interventions in schools and how they were impacting the processes of teaching and learning. In this context, this research carried out a status study on the present design, implementation, practises and outcomes of the intervention in the Yadgir and Sedam blocks of Yadgir district. All ICT interventions covering computers, Internet, radio and television were covered in the study.

2.3. Research Methodology

The research study included desk research focusing on socio-economic conditions in Yadgir district and on some key programmes in the ICT education arena in the country. The team also conducted field study on the design and implementation of ICT programmes in schools in Yadgir and Sedam blocks.

The field visits were undertaken to study the design and implementation of the ICT phase 1 and 2 programmes, the Mahiti Sindhu programme, CALP, Keli Kali and EDUSAT programmes in 30 schools across Yadgir and Sedam blocks in Yadgir educational district[18]. The research involved visiting schools where these programmes are/were being implemented and having discussions with the teachers, head teacher/head master, students, computer instructors and with parents to understand their perspectives on these programmes. This was done through questionnaires[19] and focus group discussions. The overall sample interviewed were 30 headmasters, 60 subject teachers, 15 vendor-faculty and around 50 students.

A focus group discussion was also held with the Yadgir Block Resource Centre officials and the Deputy Project Coordinator was interviewed. Seniors at the state level who design and manage these programmes, including the Director of DSERT, the Deputy Director for Education Technology were also met to get their views on the programmes. Views of DIET faculty in districts across the state were also taken on the programme design and implementation. The focus of the interviews at state, district and sub district levels include aspects relating to

Table on ICT programmes in Yadgir

Name of programme	Nature of ICT	School level covered	Organised by Government of Karnataka along with	No of schools
Mahiti Sindhu	Computer learning and computer aided learning	High School	NIIT, APTECH, EDUCOMP (2001-2007) and KEONICS (2008-)	5
ICT Phase 1	Computer learning and computer aided learning	High School	EVERRON	5
ICT Phase 2	Computer learning and computer aided learning	High School	EDUCOMP	5
Computer Aided Learning programme	Computer learning and computer aided learning	Higher Primary	Azim Premji Foundation (provided free content)	5
EDUSAT	TV (through satellite)	Higher Primary	ISRO	12
Keli Kali	Radio	Higher Primary	EDC (developed programmes)	12

Note

1.Since the EDUSAT Keli Kali and CALP programmemes can be implemented in the same school, the total number of schools in table above is more than the total number of schools visited, which is 30.

2.Azim Premji Foundation and EDC are NGOs who provided support to the department programmes on a non-commercial mode, while the other organisations were engaged through commercial contracts with the department.

programme goals, how these fit into the larger educational aims, programme design and implementation, achievements, challenges, lessons learnt, etc.

3. Study Observations and Inferences

The study observations are discussed under the following categories

1.Infrastructure issues including those relating to hardware and software

2.Curricular issues

3.Capacity Building / teacher preparation issues

4.Centralised programme design

5.Stakeholder perspectives

3.1. Hardware

Almost all the schools we visited had some issue or the other relating to infrastructure, whether of hardware or of software. The most common complaints were UPS failure, generator failure, computer break down, peripherals such as modems, printers not working, television sets not working, solar panels or satellite damaged/destroyed, etc.

During our field research, most of the computers with MS programme were not in working conditions; as a result even training on basic computer literacy was not taking place . The problem of computers not working/available was quite acute in the Mahiti Sindhu and ICT@Schools Phase I programme, and all schools visited having these two programmes were affected by hardware failure/non availability.

The situation was quite different in the ICT@Schools Phase II schools, where the computers were well maintained, though in two of the five schools, the servers (running Microsoft Windows) were affected by computer viruses. Virus attacks resulted in downtime which were attributed wrongly to hardware faults. In the case of four of the five CALC schools, such lack of understanding about virus attackes resulted in computers not being used, even though they were functional.

The BOOT vendor is responsible for maintaining the hardware as per the programme design, the actual performance seems to vary from vendor to vendor. The Mahiti Sindhu schools are worst off in terms of hardware uptime, while the ICT@Schools Phase II are better, though even here issues relating to viruses remain which can add to downtime.

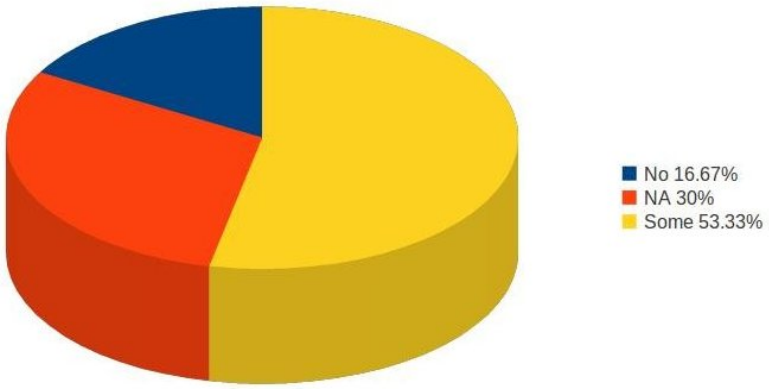
Similarly with the EDUSAT programme, we came across cases where the solar panels were destroyed, ROTs[20] broken, or the satellite or the television were not in a working condition. Although, the head teachers had complained to the Cluster Resource Centre (CRC) / BEO about the condition, they were quite helpless as there the processes for repair and maintenance of these hardware items was dysfunctional. Though as per the programme design, ISRO engineers are expected to maintain the hardware and keep it functional, this was not happening.

The case of EDUSAT clearly brings out the limitations and issues in using uncommon and sophisticated hardware - these are prone to damage which can make the programme dysfunctional. Secondly, given high rate of obsolescence as well as fragility of computer

hardware, maintenance and support costs tend to be significant. Lack of investment in maintenance and replacement means that over a period of time, more and more computers become dysfunctional, which problem is stark in the Mahiti Sindhu programme. This problem was also seen in ICT phase 1 and 2 as well but to a lesser extent (these programmes are relatively new and the technology comparatively recent). Here, although the vendor company is in charge of the maintenance, it often takes long time to be done, with weeks and sometimes months of compuer downtime going by with no computer classes in these schools.

> "They have given us all this expensive equipment but not told us how to use it. We feel it is such a waste and feel bad that is lying around like this!"
>
> - A teacher in a CALC school

In no school was there any process in place to back up data in the computer (which is an important process for preserving and sharing digital resources created by teachers and students as a part of the programme), and there was no hardware provided for data backups (external disks or tapes). These processes of retaining and reusing digital learning resources are critical to support computer aided learning and their complete absence confirms the lack of focus on computer aided learning.



Overall, Keli Kali has least infrastructural issues with only a few cases of radio sets not working, that was reported. This maybe because the only hardware required in the case of this programme is the radio which represents an older and hence more mature technology which is easier to maintain even in rural communities.

The non use of hardware is not only due to breakdown of computers and other ICT equipment but also often due to lack of required capacities for such use. Most teachers have not received any training on how to use computers. They are also apprehensive about having expensive equipment without any security measures being put in to place. One teacher in a CALC school mentioned, "They have given us all this expensive equipment but not told us how to use it. We feel it is such a waste and feel bad that is lying around like this"

As we can see from the above chart, none of the computers were working in about 17% of schools, while in around 53% some computers were not working. We did not come across any school where all the computers were working. The 30% NA schools are those where there is no computer lab (they have satellite/radio programmes)

In almost all the schools where digital cameras and scanners have been provided as a part of the programme, these are unused. The vendor faculty are themselves not very comfortable in using these equipments and are also apprehensive about breakage/repairs which may make them liable for replacement/ maintenance. The teachers are not also not familiar with these resources being available and do not demand their use in the school. The idea of providing cameras etc is to promote their use in creating digital learning resources and their non use affects possibilities of ICTs aided learning.

In one school, the computers were not being used as the teachers did not know the password and the concerned vendor's faculty member had left. Such dependance on exernal faculty, leaves the school staff helpless as they have not been trained to become self reliant. On the other hand, CALC schools neither have vendor-faculty nor have the teachers received adequate training, the non-use of computers is even higher. We came across one HPS, where the teachers had hired a local "computer person" (who himself clearly knew very little about computers) to conduct the programme. We also came across situations where TV sets have been lying unused gathering dust and so was the case with the computers. In many cases, teachers themselves appeared keen to learn and use these tools.

In one school, the computers were not being used as the teachers did not know the password and the concerned vendors had left. Such vendor lock-in leaves the school staff helpless as they have not been trained to become self reliant and overcome this problem of dependence.

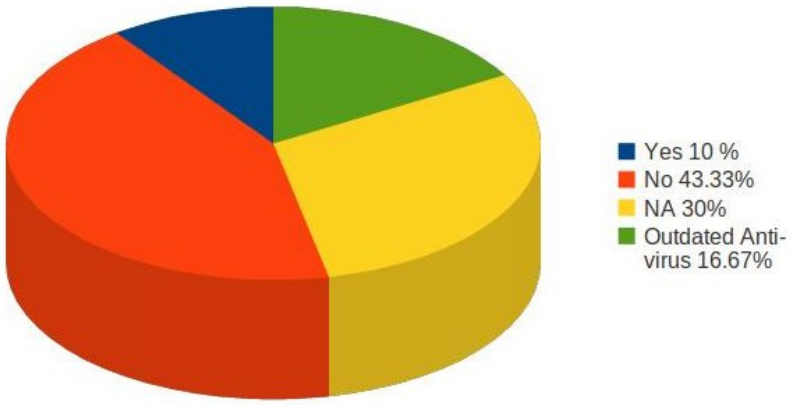
Other than these hardware issues, the other big challenge that faces ICT programmes in school is the shortage of power supply and voltage issues. This has led to degeneration of UPS and computer systems. Often vendor faculty and teachers blame shortage or poor quality of power for the programme not being effective.

3.2. Software and educational applications

The teachers and vendor faculty by and large do not have the capacity, in the absence of required training, to do basic tasks like software installation or upgrades. This limits learning possibilities, since whenever there is a software issue, addressing it takes a long time and sometimes the problem does not get fixed.

Additionally, there is the problem of computers using proprietary software in spite of the fact that software like GNU/Linux has been installed and is prescribed by the syllabus. Vendor-faculty have not been trained adequately or at all on the GNU/Linux platform and hence are hesitant to

use it. One faculty member even said that she does not use GNU/Linux because it gets stuck everyday at 2:30 pm! Since GNU/Linux is not used, the additional software applications available on the GNU/Linux platform like Open Office (office application that is equivalent to Microsoft Office Word, Excel and Powerpoint applications), GIMP (for image editing etc), educational software tools are not taught for different subjects, while on the Windows platform, only Wordpad and notepad are available and are taught. In some cases the vendor faculty have installed pirated MS Office even though Open Office is already available on the computer. There are cases where students report having learned Wordpad or Notepad for three years (classes VIII-X). Though the impact on actual teaching learning is not specified in the programme goals, it should be noted that these two applications can be learnt even in a single sitting and spending three years in their learning is a poor reflection on the learning processes.



Windows operating system requires the use of anti virus software, an additional outlay item for the programme. Anti-virus software is usually not installed and in cases where it is installed, it is not upgraded. Anti-virus software becomes obsolete rapidly and hence its non-upgrading results in computers becoming affected by newer viruses. In a few schools, the anti virus was only a trial run version with no alternative available after the trial period expired. There were also cases where vendor faculty did not know if an anti-virus had been installed in the system. As of now, the risk of virus is less as most computers are not connected to the Internet, though viruses and worms do and are spread by using infected pen drives, CDs and other storage devices. When the use of Internet increases, these computers will be prone to virus and worm attacks which will create more downtime.

The table indicates that in only 10% of schools with computer programmes, the updated anti virus software is available. In nearly half the schools, the computers do not have any anti virus software.

With respect to CALC programmes in higher primary schools, some teachers have not been able to access the content provided. This is due to the fact that they have been inadequately trained or have hired faculty who are not aware of how to do this. Here as well, there are also cases of

minor breakdowns, which they cannot fix as there is no maintenance process in place.
In a few schools, vendor faculty, through their own initiative have installed few software tools, such as Nudi to teach Kannada typing. But the number of software tools that students access, in most cases, are restricted to operating system (Windows) and Office application, neither of which are really educational software applications and hence not relevant learning resources for students or teachers. Though a large number of educational software tools are available on the GNU/Linux platform that is used in ICT@Schools phase I and II programmes, te t been installed and used, due to lack of awareness amongst the vendors and their faculty members.

3.3. Internet

None of the schools visited had a working Internet connection during the time of visit, and many had never had one working for any sustained period of time. Internet connectivity is an important requirement of the programme (and is indeed critical to support learning by allowing access to vast knowledge resources on the world wide web), and without the Internet, aided learning possibilities were reduced. Head Masters/Mistresses and teachers do realize the value of Internet for both academic and administrative purposes.
Most students lack a good understanding of what the Internet is, a few have some vague idea about it "as being a network of computers" and of "being able to get all information through internet". None of them use it outside of school, so the school becomes the only place where the Internet could be accessed. However not even in one school visited was the Internet in a functioning state. The reasons given are varied, from not having an internet connection, to lack of phone connection or phone being disconnected for non payment of bill, to modem failure, to password not working etc.

3.4. Issues of curriculum

In case of computer based programmes, the curriculum can be broken into two parts – computer learning and computer aided learning. The former refers to learning basis use of computer covering operating system, text and number editors etc. It also covers basic hardware awareness. In computer learning, computers (and related hardware and basic software) is treated as the subject of learning. In the case of computer aided learning, the computer is use as a tool to learn other subjects – such as geometry or geography. Computer aided learning can have following components – use of audio and video learning resources such as the digital learning resources (such as National Geographic channel videos), the access to Internet resources and the use of educational software tools such as Geogebra or G Compris.
In most schools that we visited computer learning is practised to a some extent and computer aided learning is almost non existent. Though the programme goals stress computer aided learning, the programme design focuses on computer literacy and not on computer aided learning.

3.4.1. Computer Learning (ICTs in education)

Within the Government education system, computer classes have not been given as much importance as other subjects. Holding computer class is not a priority - in some schools there are

no fixed classes for computer, while in some, computer periods are scheduled for the late afternoon, around the time children leave school. Computers is also not a subject in the final examination, hence sometimes students as well as teachers do not take it seriously. Also in some cases, especially in Mahiti Sindhu, the number of computers available is less, hence the student computer ratio is often high, as much as 10:1. We saw Mahiti Sindhu schools with just two computers, serving class sizes upto 30 students. In case of ICT@Schools programmes, the ratio is usually 2-3 students per computer. Also the computers are placed in a separate lab and children need to move from their classrooms to the lab and back during the course of the period. This affects the actual time available to the students on computers.

The Mahiti Sindhu text books cover Windows operating system, Microsoft Office and Internet and email. The ICT@Schools curriculum is broader, includes both Windows and GNU/Linux operating system, Open Office and Internet concepts and practice. However both text books do not get into computer aided learning of other subjects.

The curriculum needs revision as it covers the basic computer literacy themes and takes three years to teach students what could perhaps be covered in much shorter period, after removing theoritical concepts that are not relevant to students at this level , such as the DNS system of the Internet etc. The usual syllabus for 8th Standard includes the Paint application and Open Office, for 9th Calc (Open Office spreadsheet) and for 10th Nudi and Open Office presentation. Currently in ICT Phase 2 there is just one textbook for all three classes, so similar topics are taught for all. Open Office is not taught in many schools as neither vendor faculty nor the teachers have received any trained on using Open Office. In many cases, spreadsheet application has not been taught to students owing to lack of competence of the faculty. Overall, even where computers are in working condition, we find that only basic computer literacy is being covered over a three year period .

The vendor faculty members complain that there are too many students in a class and the time provided for computer class is less, during practical class, everyone cannot be accommodated, so it is done batch-wise. This often leads to students not involved in the practical class wasting time. Lastly, students are not sure why they learn computers. They consider it a fun subject and more practical in its approach, but from our interactions with them, we find that they are not very comfortable using different applications available or answering questions posed.

3.4.2. ICT Enabled Learning (ICTs for education)

In case of EDUSAT and Keli Kali, the focus is on ICT enabled learning. The curriculum pertains to the regular subjects taught in the school. There are no text books, the video and audio resources cover different topics relating to the regular curriculum. According to one teacher, “EDUSAT is very useful as the student gets practical imagination regarding the subject matter e.g. Ocean – water cycles. It also helps in revising the subject with pictures and practical explanation.” Students also enjoy Keli Kali broadcast, with music and songs added to the lessons. However, implementation and design issues affect the quality of teaching learning.

Keli Kali along with the language and time issues (which will be discussed a little later), has a

very large number of students in the class. In the Focus Group Discussion (FGD) conducted as part of the research, one teacher lamented that by the time they get the class in order, half the broadcast is over. EDUSAT also has similar issues coupled with its infrastructural problems.

However, in the case of the computer programmes, the design of the programme itself precludes Computer aided learning (CAL). Though some educational CDs are provided in an adhoc manner and even then, they are hardly used due to previously mentioned infrastructural issues. The design of the Kerala IT@Schools programme supports CAL as follows:

1. Regular subject teachers also teach computers and not computer faculty
2. Significant investment on training subject teachers – every year, all teachers receive training, initially on computer literacy and subsequently on using computers/internet for different subjects, content management systems, hardware maintenance, software upgrades, etc.
3. Since the programme is owned by the school, the teachers and head teacher put in effort to get additional computers from parent teacher associations, MP funds, etc.
4. Teachers are trained on several FOSS educational tools which they use for subject teaching. Teachers and teacher trainers create the learning resources using these tools, for use in the classroom
5. Every year, the software is upgraded and new FOSS educational tools are added which give more opportunities to teachers.

> "It is not a good idea to outsource as private companies pay us very late and do not provide us with a teacher training or skill building. Such ICT programmes should be government monitored."
>
> – a vendor faculty in a MS school

There is a need for curriculum to be integrated with ICTs to enable ICTs in education and involve the teachers in this effort. The majority of teachers interviewed believed that they should have a role to play in curriculum design and development. According to one teacher, "This makes the curriculum more concrete and also reflects the regional differences (which support teaching learning processes).

3.5. Teacher Preparation

Although infrastructural issues are visible and centralised programme design often leads to non-ownership by the school/teacher, the most significant challenge for ICT programmes in Yadgir is the lack of adequate training for the teaching staff as well as the vendor faculty. It is this inadequacy that leads to frustrations among teachers as well as their impacting their commitment. It also leads to situations in which ICT equipment remains unused.

3.5.1 Vendor Faculty

As mentioned earlier, within the computer learning programmes, vendor faculty have minimal training provided by the vendor. Many have done a one-year PGDC in computers; but are not completely well-versed in all tools. Inspite of Open Office and GNU/Linux being part of the curriculum, they are not taught simply due to vendor faculty's lack of knowledge about them.

The vendor faculty feel that they have been given a raw deal in the ICT programmes. They are

hired by the company with some basic training and are sent to the school with no knowledge of pedagogical or teaching tools. They are on short term contractual employment and receive one-third of the salary received by other teaching staff. They do not receive any salary increments and there are cases where their providend fund benefits has been withheld from them. Thus, they can be considered as para teachers. As one vendor faculty mentions, "We are not full-time teachers, hence we are not taken seriously by the rest of the staff". They are often made to undertake administrative work like typing question papers, salary statements, school data, children details, office letters, question papers, exam duties, school programmes, etc.

According to one vendor faculty in a MS school, "It is not a good idea to outsource as private companies pay us very late. They also do not provide us with any teacher training or skill building. Such ICT programmes should be government managed." Another one believes that "the company should give training on how to teach computer to students as well as discuss other pedagogical issue. They should take ownership over the programme, monitor our work and guide us." Thus the basic training provided to the vendor faculty is inadequate. Faculty who do not have any background in education are unable to provide computer aided learning to the students.

3.5.2. Subject teachers

There is a clear gap between the subject teachers and the computer programme. They are not associated with it (in the case of MS, ICT phase 1 and 2). With respect to CALC, they have not been trained adequately to conduct the programme. Most of the teachers interviewed are not very comfortable using computers. A few of them have used it for typing question papers. Just three of the 40 teachers interviewed have used computers for preparing a slide presentation or for surfing the Internet to get information for their class. These subject teachers do feel the need to be computer literate as well as see the usefulness of the computer in classroom teaching. One Maths teacher said that, "compulsory teacher training should be provided for all teachers for one hour each week." Although they do not have many ideas on CAL, they feel that once they are exposed to it, ideas would get generated.

3.6. Support and Monitoring system

The education system has a strong 'teacher education' component. The DIET-BRC-CRC structures have been setup to provide academic support to schools and teachers, including through training programmes, workshops as well as through school visits for on-site support. The academic support structure is responsible for the teacher training in different content areas as well as in pedagogy. Typically, most training programmes follow a cascade model, where the teacher trainers at DIET are trained and in turn train the master trainers at block and cluster levels who then train the teachers. The DIET-BRC-CRC faculty also make school visits to provide on-site academic support.

However, in the case of ICT programmes, the academic support structure is completely bypassed. Vendor faculty work directly with children and do not train the teachers[21] or teacher educators. The faculty has no responsibility towards the teacher educators in the DIET-BRC-CRCs. Due to this, the DIET-BRC-CRC is unable to monitor or provide support to the programme. DIET faculty

admit that their role is restricted to merely checking the physical hardware availability and they are not able to assess the actual learning processes relating to the programme in the schools. This means there is no real monitoring of the work of the vendor faculty and the effectiveness of the training (one of the consequences of which has been described earlier, that in some schools we have seen students being taught paint, notepad and wordpad for three years and nothing else). The inability to play their role as academic support personnel means thay are unable to support the use of a powerful tool in teaching learning processes in schools.

In the complete absence of meaningful monitoring by the department officials of this programme, the extent of its effectiveness is anyone's guess. As mentioned earlier, there is no system of regular formal assessment of the students learning (such formal assessment would also bring to light the quality of teaching learning in the programme). Our discussions with students revealed that there is need to have formal assessment processes to understand what value is being derived from the programme, our study scope did not include formal evaluation of student learning.

3.7. Centralised programme design

Like many other programmes the ICT in Schools programmes have a centralised design. Such centralised design has led to issues in the implementation of the programme and its working in a meaningful manner.

EDUSAT and Keli Kali programmes are not synchronised with the school timetable, leading to situations where students are having their mid day meals while the Keli Kali programme is going on. Also the topic sequencing in each subject is not synchronised with the programme timetable. Therefore, we came across cases where teachers have to repeat what they had already taught (this may be acceptable where it works as revision) but often the ICT programmes broadcast issues that have not yet been covered in the classroom, which according to some of the teachers interviewed leads to confusion in the classroom and difficulty in understanding. Thus, they suggest that these broadcasts should coincide with the timetables that they have prepared in the beginning of the year. They feel the immediate need of collaboration between teachers and programme service providers with respect to the design and scheduling of these programmes.

As per feedback from teachers, many teachers feel the programme is forced onto them. They are required to listen to / see the programmes and have no discretion to decide if the particular transmission is relevant or useful to the class at that point in time. This compulsion has led in many cases, to the programme being implemented as a ritual. At the Focus Group Discussion that we conducted, one Head Teacher mentioned seeing one teacher sitting in his room by himself and listening to the Keli Kali radio programme and ticking the assessment sheets for the programme. Teachers are known to focus more on filling up the sheets on programme contents rather than use the lesson as material to discuss with their students, during or after the transmission.

The other practical issue that emerges is that the EDUSAT and Keli Kali programmes are broadcast in South Karnataka Kannada accent and dialect, which is often not understood even by teachers in North Karnataka, let alone the students. It is also difficult for students to identify with the people delivering the programme as they are often urban and speak with a different accent.

Although global issues are being discussed which adds to their knowledge base, there is inadequate local context. Thus, students often are not able to relate to what is being discussed which leads to difficulties in understanding it as well. Thus, according to the focus group discussion with teachers and HMs, planning for such programmes should be done collectively in a participatory manner at the beginning of the academic year so that the programme and the curriculum run simultaneously in a smooth manner.

Decentralisation of such programmes perhaps to the block or cluster level[22] would allow for more local based content as well as each programme being tailor made for that particular school to take place. According to the HM of one GHS, "Decentralised programmeme helps the subject. Importance can be decided at school level and can telecast repeatedly according to understanding level of children. The class room subject and EDUSAT programmeme can be co-ordinated well which helps in effective learning." Another option that can be considered is to provide CDs of the programmes so that the teachers can use those topics which they find useful, at relevant points in their teaching, by playing it in the TV or computer in the school. This 'distributed' model would be less expensive compared to the current centralised transmission model with expensive ROTs needing to be installed.

Thus the satellite and radio programmes are centralised in design and implementation (transmission).In the case of the computer programmes, the implementation is at the school level by the vendor faculty which allows possibilities of flexibilities in their teaching. However the curriculum is centralised. New ICTs support more decentralised curriculum design and development which is explored.

3.8. Stakeholder Perspectives on the ICT programmes

3.8.1. Headmasters (HMs)

Majority of the HMs interviewed have not undergone any ICT related training themselves. In some cases, they have gone through short computer courses. This lack of training maybe one the reasons they do not engage or take ownership (apart from the programme ownership being vested with the external vendor in the BOOT model and with centralised broadcaters in the EDUSAT/Keli Kali programmes) over existing ICT programmes nor do not see its importance. They also feel let down by the programmes as their expectations were high when it was introduced but it has failed to meet the goals that it aimed to achieve. "I thought our academic and administrative works will be easy. Children learning levels will improve. But it is not up to our expectation."

They however feel the need for the programmes to continue, especially computer based programmes. The lack of ownership over the programme often leads to over dependence on the vendor faculty, who may not be completely equipped to provide required

> "I thought our academic and administrative works will be easy. Now, we are not clear about the programme, it is a new programme but it is not up to our expectation."
>
> – A headmaster on the ICT at Schools programme

administrative and academic leadership for the programme.
The perspectives of teachers is covered in the next section analysing the role and involvement of the regular subject teachers of the schools as well as the vendor faculty.

3.8.2. Parents

Parents of children in government schools desire computer education from the schools as it is either not available or not affordable to them and they understand that competence in this area can be hugely beneficial to their children. "At least in school, our children will get full computer training, because we would not able to send them to private computer centres" believes one parent. All parents believe that ICTs in schools benefits learning. Secondly though there is hope that through the knowledge of such ICTs, their children will be in a better position in the job market. But they do not have a clear idea on why or how it will. Most parents are not proactive in trying to know how their their ward is learning at school. This is also because of the socio-economic backwardness of the region, where in many cases parents are unskilled labourers on daily wage labour.

3.8.3. Students

Students are extremely interested in learning computers but most are not sure about their purpose or value. Moreover, pressures for learning other subjects affects the time available for learning computers. One student said, "No time in 10th standard though computer and internet learning is very essential." In our interactions with students, we found that in most cases, students could not recollect specifically what they had learnt in the Keli Kali and EDUSAT programmes. Similarly in the case of the computer learning programmes, very few students could discuss or explain what they had learnt. Most of them could mention only paint, notepad applications which are quite trivial. Thus, even in places where the infrastructure is in place and the equipment is in good working condition, adequate learning does not seem to be taking place.
On the other hand, students do feel that they are more involved in the computer sessions and they have much more hands-on experiences. Also in some cases of EDUSAT and Keli Kali, wherever it was working, students enjoyed these classes and this method of learning, which they felt was a change from the normal chalk and talk mode of teaching learning. Thus the ICT programmes do bring in alternate methods of teaching learning in the school, however, their impact on learning outcomes needs to be studied.

3.8.4. Programme Administrators

ICTs is a relatively new subject and the education system is still to come to full grips with it. The outsourced computer programmes are directly administered from DSERT and monitored through the DIETs. This is a onerous responsibility and requires high levels of understanding both the potential and pitfalls of ICTs as well as managing private vendors. Yet, invariably the capacities of the concerned officials has not been built for such responsibilities. DIET faculty feel embarrassed to 'monitor' the programme since they do not have much idea about computers and how these can be used to aid learning. Many have received no training on computers at all and do not use

computers in their own work. The few who have been trained or use computers restrict themselves to the text processing software Microsoft Word. Even fewer use presentation software like Microsoft Powerpoint. Use of spreadsheets or email or internet is quite limited. Though this is slowly changing thanks to departmental ICT training programmes, much more needs to be done to make the programme administrators and facilitators much more comfortable and competent to provide required support to the school. Even now, most of the policy makers at senior levels do not use computers.

Secondly, in case of the Mahiti Sindhu programme, it must be acknowledged that the programme began in 2001, when the area was quite unknown. Computer aided learning was more a cliché than a term that was well understood and the environment was quite hostile in many ways (in terms of infrastructure/power shortages, lack of understanding on handling fragile electronic equipment etc).

The design flaws are perhaps partly due to gaps in following rapid technological changes, resulting in obsoletete technical specifications like selecting Windows as the server and Linux as the desktop for ICT@Schools phase II (when windows is the most popular desktop environment and Linux is the leader on the server segment), or inadequate provision of RAM or non provision of sound cards. The possibilities of ICTs supporting decentralised approaches has not been exploited as the programme design have tended to follow legacy centralised design models. This 'safe' approach is also the reason to stick to proprietary software when free and open source alternatives have now become much more popular than they were when Mahiti Sindhu began, though even here ICT@Schools has made a break by adopting Linux.

Hence criticism of the programme design and implementation made in this report must be seen in the above context. The causes are deeper and systemic in terms of lack of adequate efforts in government systems to adopt ICTs and not because of lack of effort or intention on part of individual officials, many of who have tried their best to implement the programme as per the design.

4. Analyses of ICT programmes in Yadgir schools

> "Information and Communication Technologies (ICTs) have brought in a convergence of media along with the possibility of multi-centric participation in the content- generation and disseminative process. This has implications not only for the quality of the interchange but also for drastic upheavals of centre-dominated mindsets that have inhibited qualitative improvement of education..
>
> Modern Educational Technology (ET) has its potential in schools, in the teaching of subjects, in examinations, in research, in systemic reforms, and, above all, in teacher education, overcoming the conventional problems of scale and reach through online, any time, anywhere."[23]

According to the NCF Position Paper on Educational Technology (ET), on the other hand,

> "Schemes have largely remained supply-driven, equipment-centred, and disseminative in design. Scant attention has been paid to the development of the entire support system that would establish ET as a reliable, relevant, and timely intervention, and despite clear indications of the necessity for this action."

These perspectives resonate in this study as well. Although the programmes have put expensive ICT infrastructure in place, there is hardly any systemic support provided in terms of teacher capacity building, using computers as a learning tool, building capacities of teacher educators to provide support and monitoring to the schools, using ICTs as a tool for larger systemic reform through greater transparency and participation, etc.

4.1. Low involvement/ownership of teachers/schools

Although there has been substantial investments in hardware, there is no complementing investment in people through capacity building. The regular subject teachers by and large do not feel ownership over the programme and see it as a stand-alone activity, not connected to the larger teaching learning processes. According to the HMs and the contract staff, most teachers do not take interest in the programme. They also barely use the computers available. This may also be because they do not know how to use them. Since ICT Phase 1 and 2, as well as Keli Kali and EDUSAT have centralised design, ownership has not developed among the Government school teachers. In the case of Keli Kali and EDUSAT, the content, which is non-local is considered irrelevant or difficult to understand.

Also the element of compulsion[24] in these programmes alienates the teachers, leading to a mechanical or ritualised implementation of these programmes which has limited pedagogical value. In Keli Kali and EDUSAT programmes, though teachers have been provided with a manual and ample time to conduct activities during the broadcast itself, they still complained of repetitive teaching and lack of any material on these programmes which points to a lack of engagement or ownership of these programmes.

There are also security issues which rise due to the expensive equipment provided by the government to schools. Most of these schools do not have a night watchman or other security measures. There is the fear of possessing expensive equipment and the idea that it will get spoilt/lost that prevents teachers from using these ICTs. This has led to some situations where equipment like digital camera etc have been kept locked in the Head Teachers room and not used. The lack of ownership by the school teachers also impacts their desire to protect and use the expensive equipment. Failures of the programme (hardware failure, curricular failure, software failure) are often not dealt with quickly and the programme implementation falters.

4.2. Vendor Faculty as para teachers

Vendor faculty are paid considerably less than the regular teaching staff. On an average they get paid about 3000-4500 rupees as opposed to regular subject teachers who get anywhere between 12,000 to 20,000 per month. As earlier mentioned that have received minimum training in computer literacy and in most cases have no background in education. They are part of the school purely on a contract basis. Thus from the perspective of contractual arrangements, poor pay and work conditions[25], inadequate and even irrelevant qualification requirements, vendor faculty are in the nature of para teachers. Though Karnataka has taken a principled stand against employing para teachers owing to its negative effects on teacher professionalisation and consequently teaching learning processes and outcomes, this is violated in spirit in this programme. Thus

compared to the regular teaching staff, the vendor faculty look at their role as a temporary job and not as a career (Some of the school teachers mentioned that there is a high turnover rate amongst vendor faculty)

"If you give us some training and some examples on how to go about it, we can take it up", a headmaster says.

4.3. Lack of integration between ICT programme and regular teaching/ learning

As a consequence of the programme design in the computer programmes, the programme remains stand-alone with little integration between computer teaching learning and teaching learning of regular subjects. Thus computer aided learning, though stressed as the main goal of the programme, remains on paper. The lack of education background of the vendor faculty means that the focus is limited to computer literacy. Even here, in many cases, the faculty is not able to do a reasonable job since even for computer literacy component they are not able to bring in examples from the context of the child/school environment. Secondly these faculty have usually completed a diploma in computers with Windows as the syllabus and find it difficult to teach GNU/Linux as they themselves are not comfortable with it[26]. As a result they usually teach just the basic applications such as paint, notepad or wordpad and do not cover any of the educational tools available with GNU/Linux system. Their lack of capacities impacts the quality of even basic computer literacy component of the programme.

Although all teachers agree that computers must be used to aid learning and teaching processes, they have little idea on how this can be done. Other than general suggestions like power point presentations and educational CDs, they have yet to be exposed to free software options and on-line learning. According to one HM, "if you give us some training and some examples on how to go about it, we can take it up." In the Kerala IT@Schools programme, the process of continous and contextualised ICT education by their teacher support system has allowed teachers to integrate computers into their own regular subjects, converting the computer from being a 'subject of learning' to 'process or method of learning'. This is seen from the continuous enrichment of the learning processes through the relevant use of additional tools, from different subject based software tools to content management systems to including aspects like hardware and software maintenance. The 'school wiki[27]' programme has trained teachers in publishing digital content on the web to allow each school to have its own wiki page for sharing its work and ideas.

4.4. Curriculum integration missing

Computer literacy by itself is essential. However, for school education computers should be used beyond mere literacy to explore its potential for for supporting teaching learning processes and outcomes. Since students sense the novelty and are excited about computers, this enthusiasm should be channelised for computers to be used in subject teaching to provide additional resources for learning the subject as well as to introduce greater role for the learner in constructing her knowledge, supported by the teacher.

The computer programmes use separate / special text books that only cover ICTs. There is no

connection or linkage between this text book and the regular curriculum/content of other subjects in the schools. Since the syllabus for computers and for regular subjects has no common ground or linkages, it is an obstacle to computer aided learning. In the Kerala IT@Schools programme, the syllabus in different subjects such as mathematics or science itself has components that require use of computers and Internet. The 'computer' text books also have cases relating to different subjects. This two way linkage supports the teachers to teach their regular subjects using computers and the focus there is largely on computer aided learning, and not mere computer literacy. The Kerala SCERT is in the process of integrating the computer based learning component into the regular subject text books and avoiding making separate computer text books. For the upper primary section, where computer based learning is being introduced, there is no separate computer text book, instead existing science and mathematics text books have sections dealing with use of educational digital tools.

4.5. Richness of curricular content

It is a basic principle that learning should be about concepts and processes and not about specific products. For e.g. in using a compass box in geometry, there is no special emphasis on the Camlin brand of compass box. However in computer programmes, computer literacy is seen as equivalent to teaching products of a single vendor. This creates an impression that operating system is synonymous with Windows or text processor with Word. This is detrimental to learning these applications in a conceptual sense. Learning an operating system features in a way that enables the student to confidently attempt to use any operating system would be a better educational aim, than to make the learner learn a single system.

A second learning principle is that of diversity. There should also be diversity in the digital learning resources and platforms and the teachers and students need to be exposed to a variety of applications rather than a few, where such restriction arises from the choice of expensive proprietary platforms.

The computer programmes focus on few proprietary software applications. Mahiti Sindhu focuses purely on MS Windows and MS Office as the subjects. In ICT@Schools, though the syllabus includes Free and Open Source operating system like GNU/Linux, this has not been taken advantage of, to provide the several hundred digital tools that are freely available and bundled with GNU/Linux. As a result the teaching learning resources are highly restricted.

4.6. Internet

Internet connectivity is arguably the most powerful use of the computer in supporting teaching learning – which brings the information in millions of computers to the user and also enables the user to connect and communicate with others. Given the enormous possibilities for the Internet to be used in supporting teaching learning, a standalone computer is quite limited or basic in its use. Yet we found that in none of the schools there was regular Internet connectivity. In most of them, Internet connectivity was never provided and in the others, it was available for fleeting periods only.

The Internet is a enormous source of teaching learning resources which is exponentially

increasing and a capable teacher can use it in powerful ways. There are several portals dedicated to education itself. These web portals not only deal with subject related issues but also pedagogical issues of teaching, management in the classroom, classrooms environment etc.
The field of ICTs is rapidly changing. The ICT programmes need to also keep up with these changing tools. For this it is essential that the teachers keep abreast of changing nature, role and kinds of technologies and applications so that they are able to use the best or most appropriate tools for teaching learning, instead of using the computer basically as a sophisticated typewriter by restricting its use to word processing. For this they need to be continuously exposed to newer tools and technologies. At the same time, issues of authenticity, underlying pedagogical principles, pedagogic value of different digital resources should also be a part of teacher training so that they are able to look at CAL in a critical manner and chose what they find relevant and useful.

4.7. Educational software tools

In a learning environment such as the school, the emphasis should be on sharing a large variety of digital resources and this requires relevant capacities. Providing digital resources in an ad hoc manner affects the learning process and does not ensure equitable standards for all. Besides there are a large number of digital resources available for learning, which can be provided with nil marginal costs as they can be replicated as many times as necessary. Free and open source software applications (FOSS[28]) are also available which need to be introduced into the public education system as digital resources. Www.edbuntu.org or www,schoolforge.net of are sites where several FOSS educational are freely downloadable. The set of tools with the 'Sugar' environment is quite sophisticated for teaching different concepts in elementary and high schools
According to the National Curriculum Framework (NCF) Position Paper on ET, students should be enabled to access sources of knowledge and to create knowledge rather than be passive users[29]. This is the constructivist approach[30] advocated by NCF 2005, which can be supported through constructivistic uses of digital resources. The Internet opens up one's world and can support peer learning and constructionist[31] processes.

4.8. Outsourcing

The Computer based programmes in Karnataka (Mahiti Sindhu, ICT Phase 1 and 2) use the Build-Own-Operate-Transfer (BOOT) model, in which private vendors implement the programme by providing the computer hardware, educational software, faculty for teaching students and providing programme support. In return, the government makes periodic (monthly/quarterly) payments over the life of the BOOT period of usually 3-5 years. In this model, the entity that bids the lowest wins. The bids are usually quite low which gives the vendor very little leeway to invest in the programme, beyond the bare bones committed and their business compulsions makes the vendors look for opportunities to cut costs whenever possible[32]. One consequence of this is that the vendor faculty is also paid a low salary and given little training, either on computers or on pedagogical possibilities of computers. As these contract staff are paid less than the regular staff, they are also treated separate from the school system, resulting in the ICT programme being seen as external to the education system. ITfC research on ICT programmes in schools suggests that

for public school systems, outsourcing core areas of curriculum and pedagogy has inherent flaws.

4.9. Assessment

While the students in high school who are part of the ICT programmes do not have any formal assessment which could help identify their learning (both in computers and through computers), in Kerala, it is part of the regular board examination in class X. Without getting into the debate on board examinations and their advantages and limitations, the feedback from their teachers, students and programme administration is that this has made the programme transaction a matter that is taken seriously by all. From the examination results, which is publicly available, it appears that students overwhelmingly fare well in the computer subject. On the other hand, in Mahiti Sindhu, our discussions with students suggest that the actual transaction in some cases covers less than the syllabus, which itself is restricted largely to learning about operating system and office applications. In the absence of formal assessment processes for any of the programmes, it is difficult to understand the impact on actual teaching learning processes and outcomes.

4.10. Hardware and software maintenance

ICT infrastructure is very different from other school infrastructure (buildings, classrooms, etc.). ICTs are delicate as well as need maintenance from time to time. Thus, the Government cannot consider ICTs as just another infrastructure to be provided at a one-time cost in school. Maintenance processes must not only be put on paper but strong measures must be taken for their implementation. Besides preventative maintenance should be practised rather than shut down and break down maintenance, which proves to be much more time and cost intensive.

While governments usually provide required investment for the acquisition of assets, the provision for maintenance and repairs is often inadequate. In many cases of fixed assets as buildings or furniture, while the inadequate maintenance does affect the quality of the asset, these are still usable. However electronic hardware is highly fragile and is prone to failures. Regular maintenance, in terms of spares and repairs is essential to keep it in working condition. Hence in cases where such maintenance is not available, many computers become dysfunctional.

Software is also prone to obsolescence. Periodic software upgrades are essential, both to cater to software defects (bugs) and to security requirements as well as to new enhancements, Where software is not upgraded, as is the case with the computer programmes. Mahiti Sindhu is a decade old and with issues of maintenance often create 'computer hardware museums'. Mahiti Sindhu computers are on an obsolete Microsoft Windows version which is no longer supported by Microsoft itself[33]. It is only because internet is not provided in most Mahiti Sindhu or ICT@Schools programmes schools that the problem of viruses and other security issues in software has not completely stalled the programme. EDUSAT programme too has infrastructural issues with delays in maintenance.

There is absolutely no training on hardware and software aspects for either the teachers or the vendor faculty, hence even minor problems result in the failure of the equipment. In case of Kerala, where teachers get training on hardware and are able to resolve minor issues by

themselves and are able to access mobile hardware clinics where the issues are not resolvable at school level, the uptime is much higher.

The immediate requirement for this is a maintenance policy and a small hardware and software team which can repair the basic problems of the ICT system. A long term strategy should involve, in house teacher capacity building and introduction of different digital resources for an ICT enabled learning system to be in place.

5. Conclusions

Although there are huge expectations of teachers, head teachers, students, parents and education system officials from ICT programmes , these are yet to be fulfilled.

The Karnataka model of ICT programmes has provided for huge investments in hardware infrastructure. However this expenditure has not really benefited the school system and the design of the programme has led alienation of the schools and the teachers from the programme. The centralised design of the programmes has resulted in local school and regional contexts not being adequately catered to, adding to the alienation . Although expensive infrastructure has been provided, there are no clear processes for its maintenance. Teacher's capacities have not been built with respect to this and nor have they been trained on using these tools (whether it be computer, radio, TV), optimally to suit their curricular and teaching needs.

However, the potential for ICTs in school education can be harnessed, by adopting clear pedagogical perspectives, to address the following critical issues in education:

1. The isolation of teachers from one another, schools largely operate in silo-like manner. Hence each teacher works by herself without being able to share and receive inputs from the large community of public school teachers
2. The isolation also extends to the school-community and school-support system (DIET-BRC-CRC) areas and affects the quality of the learning processes.
3. The learning materials which are the base for the teacher to create learning experiences used are of limited quantity and quality. They are often not adequately contextual for teachers and students. Processes of curriculum design and development are limited which restrict both learning resource richness of availability and teacher professional development possibilities.
4. Inadequate transparency of the school system to the community in terms of its processes and outcomes can result in lack of enagement by parents with implications on the systems accountability. Possibilities for participation through greater transparency can help in the reform and rejuvenation of the system.

The Position Paper on “Teacher Education for Curriculum Revival” quotes from the Yashpal Committee Report (1993) on Learning without Burden: “...inadequate programmemes of teacher preparation lead to unsatisfactory quality of learning in schools...” The basic design content of the programmeme requires to be restructured to support the the changing needs of school education through appropriate teacher preparation”[34].

Teacher's should be given a space to collaboratively construct the curriculum which can be taught through digital resources. Computer or ICT enabled teaching and learning should be brought into

the design of these programmes. This requires that the programme design move from a ICT (technology) orientation to a pedagogic one and from centralised design to a hybrid mix of centralised norms and decentralised design and implementation of programmes. This would also change the resource investment from largely being on hardware, to teacher training (preceded by teacher educator training) as well as support and facilitation. As the Kerala IT@Schools programme shows, these changes can indeed lead to significant impact on teaching learning processes and outcomes. These possibilities are discussed in detail in the 'Action Plan' document.

ENDNOTES

1 EDUSAT was implemented in few districts of Karnataka, which includes Gulbarga. Yadgir was a part of Gulbarga district until December 31st 2009

2 http://planning.kar.nic.in/khdr2005/eindex.htm

3 "Education Scenario of Yadgir Block, Yadgir education district" by Akshara Foundation, Community Development Foundation and Social Initiative for rural empowerment (SIRE)

4 The newly constituted Yadgir revenue district consists of Sedam, Shorapur and Yadgir blocks

5 As per 2001 Census, the literacy rate in Gulbarga district is 48.70% (http://www.censusindia.gov.in/default.aspx)

6 Paper by Prof. Chaya Degaonkar on "Quality Elementary Education and Regional Development Status (Perspectives and Experiences of North Karnataka with focus on Yadgir Region)"

7 Around 62% of children in age group of 6-14 years have reported that they migrate at this time. See "Education Scenario of Yadgir Block, Yadgir education district"

8 Paper by Prof. Chaya Degaonkar on "Quality Elementary Education and Regional Development Status (Perspectives and Experiences of North Karnataka with focus on Yadgir Region)"

9 As discussed in the District Level Consultative Workshop on "Quality Education and Regional Development: Status, perspectives and experiences of Yadgir region"

10 "Education Scenario of Yadgir Block, Yadgir education district"

11 Check Appendix for specific Objectives of EDUSAT programme

12 http://pcf4.dec.uwi.edu/viewpaper.php?id=357&print=1

13 http://dsert.kar.nic.in/html/chapter09.html

14 http://dsert.kar.nic.in/html/chapter09.html

15 Later was called Computer Aided Learning Centres or CALCs

16 http://www.csdms.in/gesci/PromotingtheuseofICTsforEducationinIndia-AmitDabla.asp

17 http://dsert.kar.nic.in/html/chapter06.html

18 Please check Appendix for list of schools and their details.

19 Please refer Appendix for list of questionnaires

20 Receive Only Terminals, which receive the signals from the satellite

21 Recently the vendor faculty have been asked to train teachers every saturday.

22 This can only happen if the broadcast is significantly decentralised to block or even cluster level. With FM radio (community or campus radio) such decentralised broadcasting is possible. Each district AIR can have its own programme scheduling. Campus radio broadcasting at BRC/CRCs can also be thought of.

23 National Curriculum Framework (NCF) 2005, Position Paper on Educational Technology

24 Once the programme is in a school, the teacher does not have a choice but to implement it. Hence for programmes like EDUSAT or Keli Kali, the class has to tune into the programme irrespective of the teachers views on its utility.

25 In the Mahiti Sindhu programme, the vendor faculty have gone on strikes many times to altert the state level authorities about their poor working conditions, which includes non payment of salaries in time, non remittance of their PF dues, refusing leave etc. Even in the case of ICT@Schools programme, vendor faculty are unaware of their actual compensation arrangements, for eg if they have PF or not.

26 The ICT@Schools phase I and II vendor faculty have received little or no training in GNU/Linux – some of the phase II faculty have received a one time one day orientation on GNU/Linux. They have no awareness about the educational tools available freely on GNU/Linux or even of tools such as Open Office or Firefox or Gimp.

27 See http://www.schoolwiki.in

28 Www.wikipedia/foss

29 Pp vii NCF 2005, Position Paper on ET

30 Constructivism is a philosophy of learning founded on the premise that, by reflecting on our experiences, we construct our own understanding of the world we live in. Each of us generates our own "rules" and "mental models," which we use to make sense of our experiences. Learning, therefore, is simply the process of adjusting our mental models to accommodate new experiences. (http://www.funderstanding.com/content/constructivism)

31 Term coined by Seymour Papert to explain the constructuvistic possibilities of computers/Internet

32 Computer Learning programmes in Schools: Moving from BOOT models to an Integrated Approach, May 2009

33 Which means security upgrades are not available on these older versions, from Microsoft

34 NCF 2005, The Position Paper on "Teacher Education for Curriculum Revival"

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4. DSERT, Annual Report 2008-09

5. DSERT, Mahiti Sindhu Draft Report, 2005

6. Kasinathan Gurumurthy, "Computer Learning programmes in Schools: Moving from a BOOT model to an Integrated Approach", IT for Change, May 2009.

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8. National Curriculum Framework, Position Paper National Focus group on "Educational Technology", NCERT, 2006.

9. National Curriculum Framework, Position Paper National Focus Group on "Teacher Education for Curriculum Revival", NCERT, 2006.

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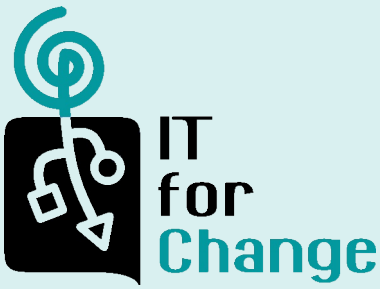
8. http://www.itschool.gov.in/

Annexure - Schools visited

Sr. No	Name of school	Area	ICT Programme
1	Government High School	Mudhol	Mahiti Sindhu
2	Morarji Residential School	Ligeri Station	Mahiti Sindhu
3	Government High School	Hathikuni	Mahiti Sindhu
4	Government Boys High School	Gurumatakal	Mahiti Sindhu
5	Government High School	Yeragola	Mahiti Sindhu
6	Government High School	Gajarkot	ICT Phase 1
7	Government High School	Adaki	ICT Phase 1
8	Government Urdu Girls High School	Gurumatakal	ICT Phase 1
9	Government High School	Kodla	ICT Phase 1
10	Government High School	Koliwada	ICT Phase 1
11	Government High School	Udagi	ICT Phase 2
12	Government High School	Handaraki	ICT Phase 2
13	Government High School	Station Bazaar	ICT Phase 2
14	Government High School	Hedgimadra	ICT Phase 2
15	Government High School	Saidapur	ICT Phase 2
16	Government Higher Primary School	Basavathpur	CALC, Edusat, Keli Kali
17	Government Higher Primary School	Yaragola	CALC, Edusat, Keli Kali
18	Government Higher Primary School	Kodla	CALC
19	Government Higher Primary School	Kolkunda	CALC
20	Government Higher Primary School	Kanegadda	CALC
21	Government Higher Primary School	Burugapalli	Edusat/Keli Kali
22	Government Higher Primary School	Madawara	Edusat/Keli Kali
23	Government Higher Primary School	Koliwada	Edusat/Keli Kali
24	Government Higher Primary School	Nachwara	Edusat/Keli Kali
25	Government Higher Primary School	Konthanpalli	Edusat/Keli Kali
26	Government Higher Primary School	Balechakra	Edusat/Keli Kali
27	Government Higher Primary School	Medak	Edusat/Keli Kali
28	Government Higher Primary School	Ramasamudra	Edusat/Keli Kali
29	Government Higher Primary School	Honagera	Edusat/Keli Kali
30	Government Higher Primary School	Saidapur	Edusat/Keli Kali



IT for Change (ITfC) is a non-profit organisation located in Bengaluru (India) that works for an innovative and effective use of ICTs to promote socio-economic change in the global South. IT for Change's research and advocacy work in gender, education and governance aims to influence the information society discourse and policy spaces at global, national and local levels, seeking to build cutting edge theoretical concepts and policy responses from a pro-South standpoint.

www.ITforChange.net

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