ICT@Schools Scheme Implementation in the States
An Evaluation

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OVERVIEW

ICT@Schools scheme was first introduced in 2004 with the aim of bridging the digital divide by imparting ICT education to Government and Government aided secondary and senior secondary students. To this end, the Government released more than Rs 2000 crore[1] during the eight year period from 2006-07 to 2013-14 and implemented the scheme in approximately one lakh schools.[2]

This paper seeks to analyse State evaluations of the ICT@Schools scheme and highlight trends and best practices.

The scheme mandates that every State/union territory hire an independent external evaluator to assess the implementation of the scheme. This working paper synthesises the findings from ten such State evaluation reports. The States/union territories that are a subject of this paper, according to their geographic span, are as follows:

- North: Uttar Pradesh, Himachal Pradesh, Punjab and Chandigarh
- North-east: Assam, Meghalaya, Mizoram and Sikkim
- South: Tamil Nadu
- East: West Bengal

1. ICT@SCHOOLS SCHEME

Recognising the critical role of ICT in achieving the country's developmental and educational objectives, the National IT task force in 1998 recommended the introduction of ICT infrastructure in schools and that 1 to 3% of the budget be spent on providing computers in secondary and senior secondary schools over the subsequent five years.[3] Following this recommendation, the Government launched its flagship ICT scheme for schools, the 'ICT@Schools', in 2004, to promote ICT literacy and ICT-enabled learning in Government and Government aided secondary and senior secondary schools. Based on the implementation experience of the first six years, the Government revised the ICT@Schools scheme in 2010.

The ICT@Schools scheme has the following four focus areas:

- *ICT infrastructure for secondary and senior secondary schools:* The scheme stipulates that each school be provided with requisite infrastructure in the form of hardware and software (10 PCs, accessories like printers, projection systems, etc.), internet connectivity, power supply and computer labs.
- *Establishment of Smart Schools:* The scheme envisions that each district would have a smart school with 40 computers, in order to act as a technology demonstrator for neighbouring schools and thereby lead the propagation of IT skills.
- *Teacher capacity building and engagement:* The scheme stipulates that every school would have an exclusive ICT teacher responsible for overseeing ICT facilities, imparting computer education to students and training the other subject teachers. It also

[1] http://www.performance.gov.in/sites/default/files/departments/school-edu/Outcome%20Budget%202013-14.pdf; page 135 and http://mhrd.gov.in/sites/upload_files/mhrd/files/State-wise%20fund%20releases%20under%20ICT%20Scheme.pdf
[2] CIET website data
[3] http://www.teindia.nic.in/e9-tm/Files/ICT_Documents/ICTatSchoolsScheme.pdf

mandates pre-service and in-service ICT training for teachers. Finally, it makes a provision for national awards for recognising innovation in the use of ICT by teachers as a means.

- *Development of e-content:* The scheme also focuses on developing and using interactive multimedia content for teacher training and class subjects such as Math, Science and English. The scheme envisions that this would be done both by outsourcing and by utilising the existing capacity of CIET and SIETs.

Within a federal Government structure, the central Government lays down the broad guidelines for the scheme, while individual States are responsible for its implementation. The cost of the scheme is split in a ratio of 75:25 between the union Government and the States. However, for States in the North-Eastern region including Sikkim, this ratio is 90:10.

Like most developing countries in the initial stages of ICT infrastructure deployment through PPPs, the central Government initially recommended that States with limited capacity adopt the BOO/BOOT (Build Own Operate and Transfer).[4] Under this model, a BOOT operator is responsible for procuring, deploying and maintaining the hardware. After a period of five years, the BOOT operator transfers this infrastructure to the States. Additionally, the BOOT operator is also responsible for supplying the content, establishing smart schools as well as hiring and training teachers. All States analysed in this working paper, except Meghalaya, adopted a BOOT approach to implementing the scheme. Meghalaya appointed a private agency on an annuity model, and also made schools a partner in the implementation process.

2. SCHEME EVALUATION

The central Government has articulated a holistic framework for monitoring and evaluating the scheme both at the central and State levels. This includes quantitative and qualitative analysis of the scheme implementation on the basis of the feedback received by different stakeholders.

At the central level, the scheme mandates the development of a real time web portal for the purpose of monitoring, mid-course corrections and sharing of best practices.

At the State level, an annual allocation of Rs 60 crore is set aside for evaluations by external independent evaluators. Ideally, these evaluations should enable course corrections by different stakeholders on the basis of the feedback received. An analysis of the evaluation reports of 10 States reveals that the main objectives for most States were:

- To assess the relevance of the project
- To determine the benefits derived from it
- To determine sustainability of the project
- To assess impact of implementation
- To assess the effectiveness, attainment of specific targets for key indicators
- To assess the amount of effort and resource used

[4]After the revision of the ICT@Schools scheme in 2010, the MHRD released a 'model bid document' for the revised scheme which mentioned that States' experience with BOOT models has been varied and at times, mixed. The document, therefore, suggested that States with adequate capacity to procure and manage the ICT infrastructure may opt for the outright purchase instead of the BOOT model.

The State evaluation reports assessed the status of implementation in terms of parameters such as hardware installation and maintenance; teacher training and engagement; development and utilisation of e-content.

2.1 Evaluation agency and time period for different States

The table below shows the name of the evaluation agency and the time period for the different States:

Table 1: Evaluating agencies and evaluation time period

State	Evaluating Agency	Evaluation Period
Assam	Department of Education, Dibrugarh University	2013-14
Chandigarh	IDC, CCE, Punjab Engineering College	Letter to MHRD dated September, 2009
Himachal Pradesh	Department of Education, Himachal Pradesh University	Not specified
Meghalaya	IIM, Shillong	Report dated August, 2011
Mizoram	Not mentioned	Not specified
Punjab	Not mentioned[5]	Not specified
Sikkim	NIT Sikkim	Inspection report dated December 2012
Tamil Nadu	Department of Humanities and Social Sciences, IIT, Madras	2013-14
Uttar Pradesh	Giri Institute of Development Studies	Not specified
West Bengal	Visva-Bharati, Santiniketan, and IL & FS Ltd on behalf of School Education Department, Government of West Bengal	2013-14

2.2 Sample Selection for Different States

The MHRD guidelines recommend that the evaluator visit at least six or 25% districts in the State depending on whether the total number of districts in the State is less or more than 20 respectively. A majority of the States had a sample of six districts, while Tamil Nadu collected feedback from eight out of 32 districts, and Uttar Pradesh from 18 districts. In Himachal Pradesh, the evaluator surveyed three out of the 12 districts in the State. On the other hand, Chandigarh's evaluation report does not mention the number of districts in the sample.

Most States collected feedback from a sample of 10 schools (both secondary and senior secondary) from each district on the basis of the following criteria, established by MHRD:

- Covered under ICT@Schools Scheme
- Higher gender gap in enrolment

[5] American Indian Foundation was responsible for the monitoring and evaluation of scheme implementation in 1300 schools. The agency responsible for compiling the evaluation report is not clearly mentioned.

- Higher proportion of SC/ ST/minority/ weaker section students
- Situated in a locality where there are problems of electricity connection
- Situated in a locality where is a problem of no or poor internet connectivity
- Situated in rural areas

Different State evaluation reports offer varying degrees of detail around the sample selection. As shown in Table 2 below, only the evaluation reports of Meghalaya, Assam and Mizoram provide information on the number of teachers and students surveyed. Evaluators in both Assam and Mizoram spoke to 60 principals each. Lastly, all States/union territories except Himachal Pradesh and Chandigarh provide information on the number of schools included in the survey. With only 11 schools, Sikkim has the least number of schools surveyed.

Table 2: No. of teachers, students, heads and schools surveyed

State	**No. of teachers**	**No. of students**	**No. of Principals**	**No. of schools**
Assam	240+60 ICT	120	60	60
Chandigarh	Information not available			
Himachal Pradesh	Information not available			
Meghalaya	198	21, 996 (all students)		75
Mizoram	240+60 ICT	240	60	60
Punjab	422+107 ICT			60
Sikkim	Information not available			11
Tamil Nadu	320+80 ICT			80
Uttar Pradesh	Information not available			180
West Bengal	Information not available			30

2.3 Evaluation Framework

The MHRD provided the evaluating institutes a detailed framework to undertake evaluation and assessment of ICT implementation in schools. For most States, this includes a quantitative analysis in the form of information to be taken from State Level Authorities, Nodal Officer/District Coordinators/District Education Officers/Inspector of Schools and Heads of schools. On the other hand, the qualitative analysis is in the form of questionnaires given to ICT teachers, subject teachers and students as well as focus group discussions.

While most State evaluation reports include quantitative and qualitative analyses, the reports of Chandigarh, Sikkim, and Himachal Pradesh do not present a clear framework of methodology adopted by the evaluating institute.

Additionally, Meghalaya has presented a balanced score card to elaborate on its findings. This balance score card classifies the beneficiary schools with regard to several indices, such as school receptiveness, learning climate, computer teacher willingness, computer teacher competence, student performance in computers, etc. and categorises them as above average, average and below average.

3. FINDINGS FROM THE EVALUATION

As mentioned earlier, in a federal Government structure, it is the responsibility of the central Government to provide a broad vision for implementation of a scheme. Based on these guidelines, the States should create their own State specific vision and formulate their implementation strategy.

It is not clear, from an analysis of the State evaluation reports, whether the States have a vision for the implementation of the scheme. A lack of State vision results in an ad hoc operational approach rather than a strategic approach to the implementation of the scheme. Only a few State reports such as those of Assam, Punjab and Mizoram discuss their vision for a successful ICT scheme. They are tied together in their desire to achieve computer literacy for the youth.

- Assam's report mentions that an IT literate Assam will help create employment opportunities for a computer educated youth.
- In Punjab, the outline vision includes promoting the usage of ICT especially in upper primary (classes 6 to 12) Government schools across the State. Their objective is also to facilitate and catalyse the growth of digital economy in the State by leveraging this infrastructure and re-engineered workforce.
- Mizoram states that given it has the second highest literacy rate in the country, it therefore can also be one of the most IT literate States in the country leading to the creation of a global centre of excellence in IT education, IT training, and software development centre.

The evaluations have largely focused on the following indicators:

1. **Status of Implementation:** Implementation agencies, number of schools surveyed in each State and time period of implementation
2. **Infrastructure Implementation:** Hardware including PCs, supporting infrastructure such as printers, scanners, projectors, electricity, internet; availability of tech support for troubleshooting and maintenance
3. **ICT Curriculum:** ICT curriculum designed and followed in schools
4. **Digital Content:** Availability of e-content as well as feedback on its quality
5. **Usage and Access by students and teachers:** Usage of ICT by students and teachers; access to ICT infrastructure to students and teachers.
6. **Competency of students, subject teachers and ICT teachers:** Competency of students and subject teachers, qualifications and ratings of ICT teachers, and administrative staff with regard to ICT.
7. **Principal's awareness:** Awareness of school principals on various parameters, such as infrastructure, competency of teachers, ICT teachers, impact of ICT, etc.
8. **MIS:** Establishment of a Management Information System in schools for administrative purposes, management of resources, information and data collection, etc.

In the section that follows, we elaborate on the compiled findings from these evaluations.

3.1Status of implementation in selected States

The number of schools surveyed in each State range from 11 in Sikkim to 4000 in Uttar Pradesh. The time period of implementation ranges from 2006 to till date. Educomp Solutions Ltd. and IL&FS Education and Technology Services Ltd., two of the biggest private educational technology companies, were amongst the BOOT providers engaged by the States. Table 3 shown below mentions the implementation partners for each of the States analysed over their respective time periods.

Moreover, some States, for instance, Assam combined the ICT@Schools Scheme with other schemes such as the Rajiv Gandhi Computer Literacy Programme.

Table 3: Implementation Agency and Number of Schools covered in each State

State	Implementation Agency(ies)	2006	2007	2008	2009	2010	2011	2012
Assam	NIIT Ltd, EDUCOMP Solutions Ltd, CMC Ltd, AMTRON (NODAL implementing agency) RGCLP Phase-V (ICT@School Scheme/RGCLP): NIIT 331 schools, Educomp 310 schools, 2009-2014. RGCLP Phase-VI (ICT@School Scheme/RGCLP): NIIT 1054 schools, Educomp 1054 schools, CMC 101 schools, 2012-2017				641 HS	1240 HS	969 HS	
Chandigarh	N/A							
Himachal Pradesh	BOT HCL Infosystems Ltd, IL & FS Ets. Ltd					628 (618 GS, 848 H and 5 smart schools in phase II, 2014-15)		
Meghalaya	M/s Aces Infotech Private Ltd (annuity model)				37	38		

Mizoram	Zarkawt, for the first 2 years	30 SS			99 SS, 1 HS	18 SS, 19 HS	171 SS, 10 HS	
Punjab	PICTES, Punjab EDUSAT Society			150	201	219	219[6]	
Sikkim	M/s Computel Systems and Services Ltd			105				
Tamil Nadu	Elcot Ltd	125 GHS	400 GHS	400 GHS				
Uttar Pradesh	Educomp				2500	1500 (phase II)		
West Bengal	Webel Informatics, IL & FS Ltd			800				

*HS- Higher Secondary *GHS- Government High
*SS- Secondary School *H- High School

3.2 Infrastructure Implementation

The scheme stipulates that schools should be provided with 10 computers per lab. All States except Meghalaya signed a contract with BOOT providers who in turn were responsible for providing supporting infrastructure and technical assistance in operation.

The infrastructure related parameters measured by the evaluating agencies in these States range from hardware availability, supporting infrastructure to technical assistance and maintenance. Table 4 in the appendix gives a snapshot of these parameters for different States.

- **Hardware:** In seven out of 10 States, schools report that a minimum of 10 computers are available in the computer labs. Of these, around 70 to 80% computers were functional at the time of evaluation. One of the States, Mizoram, reports that the number of computers available per school is too low. Some States, such as Himachal Pradesh and Sikkim, report discrepancies in delivery of infrastructure by the BOOT provider.[7]

- **Supporting Infrastructure:** There is wide variation in the availability of supporting infrastructure across States in terms of their number and functionality in different States. For instance, internet availability varies a lot between States. Some States like Punjab report 95% internet availability, while States like Tamil Nadu and Meghalaya report less than 50%.

[6] Year wise data does not match cumulative data (Punjab report, pg 14)
[7]In Himachal Pradesh, time given to HCL for implementation of ICT Project was of 5 months. However it took 6 months for the implementation with one month extension granted by the Government of Himachal Pradesh taking into account different considerable facts.

In Sikkim, the vendor took considerable time to attend to problems.
There were some derivations made by bidder in supply. HD of lower capacity, UPS supplied only 1 SMF battery in lieu of 2, processor supplied is not dual core processor. Dot matrix printer 9 pin in place of 24 pin, limited internet connectivity and software paper licenses of windows XP/Vista and MS office not submitted to department. Department of HRD penalised vendor with Rs. 84, 54, 200/- for discrepancies.

Electricity is largely available in most States, with the highest percentage, 97% available in Tamil Nadu. In States where there are electricity/voltage problems, generators are set up, such as 60% in Punjab and 100% in Assam. The availability of projectors ranges from 20% in Meghalaya to 59% in Tamil Nadu.

- **Technical assistance:** 50% of the States report availability of technical assistance, i.e., an ICT coordinator deployed to check smooth functioning of the programme. In some States such as Tamil Nadu and Assam, the BOOT operators provide technical assistance for troubleshooting and maintenance.

3.3ICT Curriculum

The availability of ICT curriculum varies a lot across States. While some States, like Punjab have created a curriculum for classes 6 to12, Mizoram and Tamil Nadu report an absence of any curriculum.

For instance, in West Bengal, surveyors report a lack of syllabi/curriculum prescribed by the State for Higher Secondary Education for classes 9 to12. Tamil Nadu's report mentions that there is no curriculum for classes 9 and 10.[8] In Mizoram, the report mentions that no prescribed curriculum or guidelines for ICT education is available and that computer education is no longer a compulsory subject. In Chandigarh, the report states that the State Government includes ICT as one of the subjects as a part of the curriculum in all the classes from 6 to 12.

3.4 Digital Content

The scheme provides for learning content on a range of subjects, such as Mathematics, English, Science, Social Sciences, either from the BOOT operator or State level institutes such as SIETs. A snapshot of the details of this parameter is attached as Table 5 in the appendix.

Most States acquired content through BOOT operators: Seven of 10 States reported acquiring digital content from their respective BOOT operators. The State of Mizoram reports content availability from their SIET. Punjab, in collaboration with American Indian Foundation, also involves teachers in content creation process. Furthermore, AIF provided training to teachers to develop e-content based on hard-spots identified in the curriculum. This content is also uploaded on a website and disseminated to students. The reports of Chandigarh and Sikkim, however, do not mention a provision for e-content in their evaluation reports.

Inconclusive feedback on the quality of the content: The feedback on quality of content is not conclusive. In Chandigarh, in the absence of information available on digital content, the report records students' feedback that the school library should stock more education content in the form of CDs on Math, Science and Computer. Meghalaya highlights the inadequacy of interactive material and the poor quality of animation wherever material is available. The Punjab evaluation report, on the other hand, states that 52% teachers considered ICT to be effective in overcoming hard-spots in various subjects.

3.5 Usage and Access

90% of the State evaluation reports include information on the usage, access and, in some cases, the feedback from students and teachers on the ICT infrastructure available in schools. Analysis of this information broadly suggests that students do not have sufficient access to school computers and that only a small percentage of teachers use technology for lesson planning. The details of this indicator for both students and teachers across different States, is appended as Table 6 at the end of the paper.

Students: The evaluation reports provide information on student access to school computers in terms of the time that they are allocated on a daily/weekly basis to use the computers. Some States also reported the student/computer ratio. Lastly, the reports capture feedback from the students regarding their satisfaction levels on the usage of the computers. Key insights from the State evaluation reports are captured below:

- *High student/computer ratio:* Many States report that the number of computers available is not enough to ensure that all students get access to the machine. In West Bengal, as many as five students had to share a computer simultaneously.

- *Insufficient time allotted for computer access:* This analysis of the State reports indicates that the amount of time students have with the school computer varies from 45 mins-1 hour per day in Assam to 1.3 hours per week in Punjab. Students in some States/union territories such as Punjab and Chandigarh report that they do not have sufficient time with the computers. The evaluation reports of Assam and Tamil Nadu indicate that only a small number had access outside school hours and even fewer had personal email ids. In Tamil Nadu, only students who opt for ICT as their elective subject get access to computers.

- *Activities for which ICT is used:* As mentioned in the evaluation reports of Assam and Meghalaya, in terms of activities pursued, it appears that students enjoy playing games or looking at visual images. The reports also mention that some students used it for creative work, a few for chatting and even fewer still for research or functional purposes.

Teachers: This includes information on access available to teachers and whether they use ICT in lesson planning, and feedback, which includes their perception of ICT use.

- *State reports provide no or inadequate information on how teachers use technology:* Four of 10 States/UTs (Punjab, Meghalaya, Sikkim and Chandigarh) do not provide any information on teachers' usage and access to ICT.

- *A small percentage of teachers use technology for lesson planning:* A low percentage of teachers use ICT in lesson planning or otherwise, such as 18% in Tamil Nadu, and 9% in Mizoram. In Uttar Pradesh, about 53 % of the total sample subject teachers claim to use ICT as teaching tool to teach their subject in the schools. In some States, teachers also use ICT for administrative purposes.

3.6 Competency

This parameter includes compiled information on the competency of the administrative staff, ICT teachers, students and subject teachers, including training programs conducted for building capacity. A snapshot of this indicator is attached as Table 7 in the appendix.

Non-Teaching Staff

Training: In Mizoram, Uttar Pradesh and Chandigarh, there is a training programme in place for the administrative staff. In seven out of 10 States, the administrative staff is either not trained, or this information is not mentioned or available. Mizoram and UP's reports make a mention of training programmes for administrators along with the finding that they had very low competency levels in ICT.

ICT Teachers

Self Rating: In Assam, Meghalaya, Mizoram, a few teachers are reported to be 'above average' and even fewer as 'excellent'.

Qualification: Notably, only a few States assess whether the qualification of teachers is in accordance with the guidelines provided by the MHRD. The MHRD recommended the appointment of ICT teachers with PG degrees. West Bengal, one of the States that records teacher qualification, mentions that 90% of the teachers surveyed have only a one year diploma.

Dissatisfaction with remuneration: In four of 10 States (Assam, West Bengal, UP, Meghalaya), ICT teachers report dissatisfaction with their remuneration, contract and nature of employment.

Training: In Punjab, there is a five-day induction training for all the teachers of ICT and one computer centre set up in each district alongside the DIET/GSITC for training teachers in ICT.

Students

Competency: The evaluation reports of seven States, suggest that teachers could notice progress in the students' competency and increased interest in ICT. The Chandigarh report records observation made by ICT teachers that many students are able to acquire ICT skills and it is a boon for them.

Self -rating: In Meghalaya, Mizoram, Tamil Nadu, UP, most students consider their skills poor or average. However, one finding to be highlighted is that students are very enthusiastic to learn IT. In UP, it is insightful to note that students who are competent in IT belong to high-tele density districts, while those who are not as competent at it, belong to backward and low-tele density districts.

Teachers

Training: Four of 10 State reports (Himachal Pradesh, Punjab, Sikkim, Meghalaya) have not assessed the competency of the subject teachers. The Chandigarh evaluation report states that, at the time of evaluation, the training programme for subject teachers was still ongoing. 50% of the States mention training provided to teachers, after which their IT skills significantly improves to the level of good, fair or average on the whole. In Himachal Pradesh, IL&FS conducted a five-day teacher training programme in 30 institutions. In Mizoram, the teachers report a need for training in order to improve their use of ICT in teaching and lesson planning. In Uttar Pradesh, only 35% teachers are trained, while in Tamil Nadu, 22% are trained in ICT use.

3.7 Principals' awareness

Across States, evaluation reports touch upon the awareness of principals providing feedback on awareness of the scheme, teachers' competency, infrastructure and impact of the ICT scheme.

Overall, the scheme implementation lacked a strong focus on building awareness and capacity of principals. For instance, West Bengal's report observes that there is poor awareness of the scheme and its components. 20% of principals do not know what the vendor supplied. In the Birbhum district, in 30% schools, even teachers lack awareness of the ICT scheme.

The Tamil Nadu report, however, states that better awareness on the part of headmasters led to a more positive impact. It mentions that headmasters are sufficiently aware and gave feedback on the use of equipment and the need to allocate funds in the annual budget for ICT repair, since the BOOT provider does not provide replacement warranty. Headmasters in the Tamil Nadu report also promote the use of technology through scholastic and non-scholastic activities. Another example of good awareness of principals is seen in Meghalaya's State report, where 72% of the surveyed principals had seen the digital content provided to students. The Mizoram State report also mentions that awareness sessions were held for the headmasters and subject teachers in approximately 41% of the schools in all six districts.

3.8Management Information System (MIS)

Some States created a Management Information System (MIS) to manage data collection and allocation of resources. Schools use ICT to generate test papers, report cards, and create and maintain official school records. Unlike Assam, where none of the 60 schools surveyed have a school website[9], in Tamil Nadu, the State Government has created a Management Information System (MIS) to manage its data and resources on education. The Government plans to provide a smart card, integrated with MIS, comprising details pertaining to students, where data will be stored on a central server.

One out of eight districts in Tamil Nadu provides data on MIS report generation. It also has a PIS (Personal Information System), which stores information on personal details of students and staff, accessible only to teaching and non-teaching staff. Headmasters also express that a website is a great tool to generate interest in students, to reach out to prospective students and a good resource in general.

In Punjab, all the schools use ICT to perform administrative work such as f emails, generating MIS report card, accessing information on the internet, etc.

4. Examples of innovative practices

Identifying hard-spots and involving teachers in content creation: In Mizoram and Himachal Pradesh, the BOOT operator creates content according to the hard-spots identified by teachers and teacher educators. In Himachal Pradesh, the content is based on 614 hard-spots in Hindi medium (for classes 9 and 10) and in English medium (for classes 11 and 12). The operator delivers the content to every school in 14 DVDs.

Redressal system: In Himachal Pradesh, the BOOT operator has installed a helpdesk manned by two engineers to enable schools to lodge complaints on the hardware infrastructure. This facility is active for the project period up to March 31, 2013 at the Directorate of Higher Education as per the conditions of the tender.

Training programme: The Punjab Government has partnered with American Indian Foundation (AIF) and Microsoft to provide refresher training and advance training to teachers respectively. AIF trains teachers with the help of its 'Digital Equalizer Programme' which is based on the integration of technology and pedagogy. The objective of the training is to enable teachers to develop e-content and upload it on the website (www.depunjab.org/edukit.php) so that other teachers can use it.

Monitoring: The Punjab Government has created a mechanism to periodically assess the scheme implementation vis-à-vis infrastructure, educational quality and administrative processes. The multi-tiered evaluation mechanism involves Government officials across various levels within a district.

School Involvement: The Meghalaya Government appointed a private agency on an annuity model, thus sharing the responsibility between the Government, school and the provider. Schools were made responsible for bearing certain costs such as internet connection and electricity. The State of Meghalaya also demonstrated significantly higher school involvement, in that more than 70% of school leaders had at least seen digital content unlike other States where the principals are not even aware about the scheme.

5. Limitations of evaluation

The tendering process followed for selecting the external independent evaluator is not clear: The State evaluation reports make no mention of the financial and technical competencies on the basis of which the independent external evaluator was selected.

Limited coverage: While the MHRD guidelines suggested that evaluating agencies should select a minimum of six districts in each State, not all States met this requirement. In Sikkim, surveyors visited only 11 schools, while in Himachal Pradesh, the evaluating agency selected three out of 12 districts.

Some reports do not record the source of qualitative feedback: Several evaluation reports present qualitative feedback without providing the source of this feedback. This is particularly true of Chandigarh and Sikkim.

The quantitative aspect focused inordinately on the status of hardware installation: Surveyors appear to have placed an inordinate amount of emphasis on infrastructure provided to schools without paying sufficient attention to how technology is being integrated in educational processes.

In conclusion, it is important to build a robust monitoring mechanism not just to measure the success of the program but also to collect more real-time feedback to incorporate in the implementation of the scheme. Thus, the central and State Governments should analyse the status of the ongoing evaluation processes and design a rubric that assesses the role of

technology in achieving broader goals of school education. In addition to assessing the status of infrastructure implementation, the States must also strive to understand the factors that are inhibiting the school-level ownership of ICT initiatives.

Finally, the ICT@Schools scheme sets aside an annual budget of Rs 10,000 per school for the monitoring and evaluation of the scheme implementation. The analysis indicates that none of the States conducted a census based assessment and furthermore, the sample size in some States was as low as three schools in some States. In order to gain a comprehensive understanding of the scheme implementation, the States should give serious thought to generating evidence through a census based M&E process.

6. Recommendations

The implementation experience of the ICT@Schools scheme over the past decade suggests that there is a definite opportunity to strengthen the scheme both in terms of the policy framework as well as the practice. This is corroborated in the State evaluation reports synthesised in this working paper.

This experience underscores the need for the central Government to go beyond providing just ICT infrastructure in schools and thus, articulating and following through on a strong vision on how ICT can have systemic impact on school education. Moreover, the central Government must have a shared understanding with all the implementers including the State Governments, school leaders, teachers, and agencies such as CIET and service providers on the implementation strategy of the scheme. At the same time, the policy implementers must have the flexibility and the ownership to be able to successfully integrate technology in curriculum transaction and school processes.

Lastly, the scheme document must undergo a revision to align it with the more recent National ICT Policy for school education that is much more comprehensive in nature and lays emphasis on strategic initiatives such as technology integration, e-governance, inclusive education etc.

More specifically, the following recommendations emerged from this exercise:

- **Contextualising State Governments' implementation strategy:** The central Government should encourage the State Governments to develop a contextualised approach to implementing the scheme instead of a one-size-fits-all approach. For instance, none of the States have questioned the central guideline of providing alternative infrastructure (e.g. tablets) to the 10 PCs per school suggested in the scheme. Furthermore, the central Government must ensure that States learn from each other and thus, facilitate the sharing of best practices and innovations between them.

- **Creating school ownership towards the use of ICT:** As mentioned earlier in the paper, principals have low levels of awareness towards the implementation of the ICT@Schools scheme. This contributes to the lack of infrastructure maintenance and the low levels of technology integration in teacher practice and administrative tasks. In order to create greater school level ownership, the States must empower principals to interact with and hold the BOOT operator accountable for the quality of service provision. This tripartite

arrangement between the State, the BOOT operator and the school principal will create an environment conducive to school level ownership, planning and accountability. It will enable the State to strengthen their evaluation processes by articulating a clear set of demands from the school. It will also enable principals to encourage teachers and students to be active participants in integrating technology in curriculum transaction and school processes.

- **Linking student and teacher ICT competency with overall vision for education reform:** The implementation of the ICT@Schools scheme largely focuses on providing infrastructure to schools with little attention to how technology can be integrated in educational processes such as teaching learning. In its current format, the scheme imparts only computer literacy to students and teachers. Thus, there is a strong need to locate the scheme implementation within a robust teacher and student ICT competency framework. In order to do this, the State Governments must follow an ICT curriculum that bears correlation with the direction of the national education reform. In fact, CIET has developed a standard and comprehensive curriculum for ICT in education for students and teachers that aims to provide a broad exposure to a variety of tools and technologies. The integration of this curriculum should be encouraged and monitored across States.

Appendices

Table 4: Findings on Infrastructure

State	Hardware	Supporting Infra	Tech Support
Assam	PCs- 100% laptops- 55% Classes covered: V - XII	Projectors- 55% Printers- 98% Scanners- 88% Modems- 98% Generators- 100% Internet nodes- 56% UPS- 100%	Surveyors found that the education service partners that is NIIT Ltd. and EDUCOMP appointed a school coordinator for each school to provide technical support and handle both hardware and software equipment.
Chandigarh	Insufficient data	2469 schools have purchased generators.	
Himachal Pradesh	Bidder was required to provide machinery but no actual record of it is mentioned in the report.		1 cluster coordinator for every 20 schools was deputed by HCL for monitoring and refresher training. Collection of MMR was done by Cluster Coordinators and submitted to the Directorate of Higher Education every month.
Meghalaya	973 computers in 70 schools.[10] Computer in office- 71% Computer labs- 97% Out of the 973 computers, 68% were from the ICT@school scheme and rest from other sources.	Internet facilities with debatable reliability- 44% Projectors- 20% [11]	
Mizoram	Barring 2 districts, more than 60% schools had computer labs. Number of computers supplied to the school is very less as compared to the total strength of the school.	Electricity was available at large. Solar power and inverters mostly missing. Internet connectivity is not available in almost any of the schools.	15% schools reported availability of tech support. 17% were provided with this mechanism.

[10] Meghalaya reports that it was difficult to reach a few schools due to the road conditions. The only way to reach these schools was through telephone.
[11] Not all 75 schools responded to the survey questions.

Punjab	Computer labs- 90% Computers- 100% Functional- 85%	Internet- 95% Gensets- 60% Electricity voltage problems- 40%	
Sikkim	75-80% computers working. Visit was made at end of academic year and surveyors informed that remaining machinery shall be repaired during vacation. Some schools do not have OS CDs, essential for repair.	Earthing not done properly, voltage affects performance of computers.	Schools do not maintain stock register of items. Vendor takes time to attend to problems. There were some derivations made by bidder in supply. HD of lower capacity, UPS supplied only 1 SMF battery in lieu of 2, processor supplied is not dual core processor. Dot matrix printer 9 pin in place of 24 pin, limited internet connectivity and software paper licenses of windows XP/Vista and MS office not submitted to department. Department of HRD penalised vendor Rs. 84, 54, 200/- for discrepancies.
Tamil Nadu	Computer labs- 90% PCs- 100% Working- 78% OS- 54%	Schools not networked- 92% Server with terminals- 95% Reliable electricity- 97% Projectors- 59% Internet- 34%	Only 20% of the schools in Chennai district got external support. It was provided by IIT-Madras in form of subject oriented training in a school and Microsoft and NIIT in form of 10 day training camp for teachers and HMS on basic computer skills in another school.
Uttar Pradesh	In all schools, approximately 10-11 desktops available.	Reliable electricity- 88% Generators- 43% Solar power- 13% Internet in rural	

		areas- 67% Internet in urban areas- 33%	
West Bengal	OS Ubuntu was installed. According to IL&FS, all 800 schools supplied with infrastructure. Free and Open Source Sofrware recommended by Govt.	Electrical wiring done in all schools. Across 3 districts surveyed (Birbhum, Burdwan and Bankura), internet connection not available but computers are linked to wi-fi network. There is demand for accessories with updated configuration.	Surveyors report that supplier of computer equipment (Chirag) lost their credentials so IL&FS had to approach DELL for next phase equipment. Delayed deployment of hardware installment found in many cases according to surveyor.

Table 5: Findings on Digital Content

State	Provider	Status	Feedback on Quality
Assam	Designed and obtained from third party.	Information not available	Information not available
Chandigarh	Information not available	Information not available	There is demand for multimedia education content CDs by students, for Math, Science and Computer. Students feel that the school library should stock more such educational CDs.
Himachal Pradesh	IL & FS	E-contents were delivered at every school in 14 DVDs with a copy of the same to all the Deputy Director of Higher Education Office and one set of contents at Directorate of Higher Education. Hindi content for 9th & 10th Science, Social Science, Mathematics, English content for 11th & 12th Physics, Chemistry, Biology, Mathematics, English.	

		The content was based upon all the identified 614 hard spots in subjects.	
Meghalaya	M/s Aces Infotech Pvt. Ltd.	A set of 6 CDs provided to every school. These CDs cover Math, General Knowledge, Physics, Biology, English and Chemistry.	Lack of interactive materials (except for the CD on General Knowledge). Poor animation quality. The CDs are incapable of igniting any additional interest in the students. Translated e content will be more effective than English resources.
Mizoram	It was mentioned that e-content was required to be developed by SCERT or State Institutes of Educational Technologies.	Hard spots were identified by teachers and teacher educators and private firms built e-content which was scrutinised and modified by expert committees before getting finalised.	52% of the teachers consider ICT to be effective very effective in overcoming Hard spots in subject teaching.
Punjab	American India Foundation (NGO), Punjab EDUSAT Society, BOOT provider.	Subject teachers were trained to develop multimedia content on hard spots by AIF. These are uploaded on the web and disseminated in schools. In 2 districts, 5% ICT teachers develop content, 11% in 1 district and 0 in others. 75% schools have an e-library. Apart from this, CAL content uploaded on EDUSAT library.	Around 80% across most States of the teachers showed satisfaction with the quality and transmission of e-content but only 30% of them found the methodology being used as innovative. Students gave a positive feedback to the e-content.
Sikkim	Information not available.		
Tamil Nadu		Education Content Server with various contents and resources to facilitate the teaching learning process for curricular and co-curricular activities.	
Uttar Pradesh	More than 86 percent schools obtained subject based e-content through third	The coverage of ICT syllabus through e-content has been in all schools. There has been regular use of ICT based e-content in	The use of ICT content has been reported to be regular in maximum urban districts and in districts with low-tele density.

	party.	school curriculum in over 52 percent sample schools.	
West Bengal	E-content provided by the vendor (IL&FS).	Provided in 800 schools.	

Table 6: Findings on usage and access for students and teachers

State	Students' access and usage	Feedback	Teachers' access and use	Feedback
Assam	Over 90% students allotted 45 min-1 hr/day. At the State level, approximately 33% students use internet while 67% don't. 23% of students have been using computers for three or more years. Their present uses were reported as being frequent 70% reported using computers at least 4 to 6 times a week at school.	Students reported that computers were usually in computer labs and that they generally use them in groups. More than 1/10 students state that using a computer helps them with their school work. This was mainly through use of internet. 12% students have their own emails ids while 88% don't. Students want to spend time watching images, access documents, games and videos.	58% of 240 teachers use computer in teaching. 32% have access outside class hours. Out of teachers and headmasters combined, around 22% use internet while 78% don't. 48% teachers and HMs have email ids, while 52% don't.	Newly appointed teachers more likely to use ICT. On the whole, few use it in lesson planning.
Chandigarh	Computer education made part of curriculum in all classes from 6-12, from 01. 04. 2009. No information available on actual access and usage	Students feel that time allotted for computer classes is inadequate.	Information not available.	Chandigarh
Himachal Pradesh	Information not available.			The bidder was to train teachers in ICT

				usage but no actual information on implementation available.
Meghalaya	Duration of classes varied from school to school, ranging between 30-60 min periods. Out of 69 schools, 67% made computer classes compulsory for classes 5 to 10- even though it is an elective subject.			
Mizoram	Creating and communication recorded almost 100% unused. 67% students liked looking at videos and images, 52% played games and 13% like chatting but were unable to, due to unavailability of computers. Slot of computer education is not reflected as such in time table of most of the schools.		9% teachers use technology. 28% use it in lesson planning and 21% in preparing test papers. None use it for administration or educational recreation.	A potential number of teachers believe that technology has many applications and are keen to use it in the future, if they are given training.
Punjab	On an average, students spend 1.3 hrs/week on the computer.	20% students get enough time to practice. 62% complain of insufficient number of computers.		
Sikkim	Information not available.			
Tamil Nadu	25% students have never touched a computer.	8 periods of 45 min each/week to ICT students who opt for computer science. 38% have limited		

		access. Of those who have access, 12% use it for research. 63%, 68% and 70% of the students never use ICT for informative, functional and creative purposes respectively. (table 16)		
Uttar Pradesh	ICT use highest among students of classes 9 and 10, and lowest among students of 11 and 12 across all districts. 78% students use computers for creative work, 67% for research. According to students, 42% like playing games and 57 % like watching videos/images and only 34% use it for using word, excel or power-point.		School computer accessible to over 60% teachers. 85% of these have access for 1-3 hrs/week. 53% teachers use ICT for teaching.	Teachers use internet occasionally, they are not computer savvy and 88% don't have email ids.
West Bengal	Teaching classes 5-10/12, whereas ICT only for 9-12. Thus, huge pressure of students in all classes and hence ratio goes up to 5:1.		In Bankura, computers are used neither by students nor teachers.	One HM commented that computer should perhaps be taken away since they are hardly used after installation.

Table 7: Findings on Competency

State	Administrative staff	ICT teachers	Students	Subject teachers
Assam	Administrative personnel across districts have no capabilities or awareness about ICT	75% had good or very good ICT capabilities.	Out of 120 student respondents 14% the students are also capable to handle MS Office, accessing	School teacher and headmasters have very little awareness about ICT. None of them were able to give feedback.

	programme (29). However, 21% non-teaching staff are rated good, 26% fair and 13% have no capability.		documents class materials from using internet.	Only 32% of science teacher and 18% of Arts teachers rated their ability as either intermediate or advanced with regard to using teaching and learning methods that are facilitated by ICT. 0% excellent, 15% very good, 60% good, 22% fair and 3% have no capability.
Chandigarh	The training programme was ongoing at the time of evaluation.		ICT teachers are happy with the performance and interest of the students. Students have acquired a number of IT skills.	The training programme was ongoing at the time of evaluation.
Himachal Pradesh	No mention of acquired competency.			
Meghalaya		Competence was 13 above average, 42 average and 20 below average.	Students' competency was 9 above average, 34 average and 32 below average.	
Mizoram	After training 7%, 55%, 30%, 8% of them were graded as very good, good, fair and not capable respectively. None of them were graded as excellent.	26% of the teachers rated themselves as poor, 37% of them rated themselves as average while 31% rated themselves as good and only 6% rated themselves as excellent in terms of their own expertise in using ICT.	Almost half (49%) of students considered their own skills poor. Only 18% and 44% of sample students perceived their computer skills as good and average, respectively.	After training 5%, 40%, 43%, 12% of them were graded as very good, good, fair and not capable respectively. None of them were graded as excellent.
Punjab		The induction training of 5 days done for all the teachers of ICT and one computer centre has been setup in each district alongside the DIET/GSITC for the	According to teachers' feedback, students are curious and enthusiastic about learning computers.	

		training of teachers in ICT.		
Sikkim	Not mentioned			
Tamil Nadu	None of the administrative staff is trained in ICT.	Most of the ICT teachers hold a Masters Degree in Computer Applications/Computer Science along with a B.Ed. qualification.	Students' self-rating revealed that 41% felt their level of skill was 'bad', 39% felt 'average'. 20% rated themselves good/excellent.	Out of 2347 teachers (secondary grade), 22% have been trained in ICT. For competency and comfort in using technology, self-rating revealed 5% confident, 37% fast grasping, 26% average, 10% below average and 30% not satisfied.
Uttar Pradesh	18% received ICT training. Capability of trained personnel was average.	Majority 61% of the appointed ICT teachers have PG degrees along with computer diploma (MA/MSC/M.com and P.G.D.C.A.).	According to subject teachers, only 29% of the students are enthusiastic/very enthusiastic towards technology, rest of them being average, lukewarm or passive.	35% teachers received ICT training. Self-assessment of teachers in terms of acquired expertise in the use of ICT indicates that over 40% teachers are still poor in this respect.
West Bengal		Well trained ICT teacher not found in any schools at time of survey. Secretary feels the assessment is unclear. Issue to be taken up with BOOT operator.		Teacher training of 10 teachers at each school ongoing. Surveyors report that in rare cases teachers got training, whether inductive or refresher. (Secretary wants issue to be taken up with BOOT operator). Training programme not functioning properly. No training provided to assistant teachers in 90% schools in Burdwan.