REPORT ON

- Status of Secondary Education in Chhattisgarh
- Technology Readiness for CLIx Intervention in Chhattisgarh
- CLIx in Chhattisgarh

CLI CONNECTED LEARNING INITIATIVE

March 2017

An Initiative seeded by

TATA TRUSTS

RE-IMAGINING FUTURES
TISS

Founding Partners

Massachusetts Institute of Technology

CLIx (2017)

TISS/CEI&AR/CLIx/RP1(CG)/12 March'17

The Connected Learning Initiative (CLIx) is a technology enabled initiative at scale for high school students. The initiative was seeded by Tata Trusts, Mumbai with Tata Institute of Social Sciences, Mumbai and Massachusetts Institute of Technology, Cambridge, as founding partners.

Collaborators: Centre for Education Research & Practice - Jaipur, Mizoram University - Aizawl, Eklavya - Madhya Pradesh, Homi Bhabha Centre for Science Education - Mumbai, National Institute of Advanced Studies - Bengaluru, State Council of Educational Research and Training (SCERT) of Telangana - Hyderabad, Tata Class Edge - Mumbai, Govt. of Rajasthan, Govt. of Mizoram, Govt. of Chhattisgarh and Govt. of Telangana.

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PREFACE

The Connected Learning Initiative (CLIx) is the outcome of a collaboration between Tata Trusts (India), Tata Institute of Social Sciences (TISS, Mumbai, India) and Massachusetts Institute of Technology (MIT, Cambridge, Mass., USA). CLIx aims to provide high school students from under-served regions, opportunities for participation in quality education through meaningful integration of technology. CLIx is geared to provide engaging, hands-on learning experiences in Mathematics, Science, Communicative English and Digital Literacy, integrated with value education and skills relevant to the 21st century.

As a platform for innovation in education, CLIx also supports the professional development of teachers, making substantial contributions to teacher education in Indian languages. Research activities and collaborations aim to nurture a pool of professionals from the fields of education, technology and science. Supported by an interconnected network of partners, institutions, public education systems, teachers and learning resources, CLIx is developing a scalable and sustainable model of education, providing students with, technology enabled opportunities of deep and authentic learning. In the first phase, these resources are being offered to students and teachers of government secondary schools in the four Indian states of Chhattisgarh, Mizoram, Rajasthan and Telangana, in Hindi, English and Telugu.

Challenges facing students from rural areas who manage to reach high school tend to include weak foundations laid in primary years, unavailability of resources in their own languages, isolation and poor access to learning opportunities and lack of qualified teachers, particularly in Maths, Science, and English. In this context, CLIx addresses both curriculum content and pedagogical approaches to work with students and teachers to deliver quality solutions at scale. CLIx aims to reach approximately 1,000 schools and 150,000 students in four states during 2015-2017. With an eye on capacity building, Teacher Professional Development (TPD) courses for approximately 2,700 teachers are to be conducted during the same period.

Successful implementation of the project could pave the way for expansion, not only in terms of schools, but also in terms of states covered, subjects and age-groups. The future would lie in the replication of the model throughout the country. The two main aspects that are at the core of the CLIx implementation approach are integration of technology and an ecosystem approach for sustainability. Through such an approach, we envision processes

whereby communities build and share knowledge with each other. Capacity building of high school students, student-teachers, teachers and teacher educators are an integral part of the sustainability plan. CLIx has partnered with locally invested institutions and groups to utilize their experience and existing resources in optimal ways.

Technology is an integral part of CLIx and it is being thoughtfully used to design the curricular offerings (modules/courses). For most components of the CLIx offerings, Information and Communications Technology (ICT) infrastructure is essential. Most government high schools and higher secondary schools have received such infrastructure through the ICT@Schools scheme, now merged with Rashtriya Madhyamik Shiksha Abhiyan (RMSA) of the Government of India. CLIx is using the existing infrastructure, wherever feasible, and trying to build on it, as needed, through support from state governments and other agencies. CLIx platforms and offerings are designed to take advantage of technological advancements opening up in future.

This document is divided into three parts. The first part provides a brief account of the status of secondary education in the state of Chhattisgarh and presents the recent trends in enrolments, equity, quality, efficiency and financing of secondary education in the state. It is based on data collected from various secondary sources and can serve as a useful reference to understanding the context in which CLIx is being implemented. The second part of this document presents how CLIx has helped build technology readiness in the intervention schools so that the schools are prepared to implement the programme. The third part of this document presents the status of implementation of CLIx in Chhattisgarh, particularly the roll out of student modules and teacher professional development. It also summarises the main challenges in implementation and makes recommendations for future action.

List of Tables

Abbreviations

DISE	District Information System for Education
HDI	Human Development Index
MHRD	Ministry of Human Resources Development
MRP	Maximum Retail Price
RBI	Reserve Bank of India
RMSA	Rashtriya Madhyamik Shiksha Abhiyan
SCERT	State Council of Educational Research and Training

Status of Secondary Education in Chhattisgarh

I. Status of Secondary Education in Chhattisgarh

1. Introduction

Education is a critical tool for the attainment of sustainable growth and development. In this regard, primary education acts as the basic enabling factor for participation, freedom and overcoming of basic deprivation; whereas secondary education facilitates economic development and establishment of social justice. Over the years, liberalisation and globalisation have led to rapid changes in scientific and technological world and have prompted the general needs of improved quality of life and reduced poverty. This undoubtedly necessitates the school students to acquire higher levels of knowledge and skills than what they are essentially imparted with throughout the eight years of elementary education. Also, a crucial stage in the educational hierarchy, secondary education empowers children by preparing them for higher education and the world of work. Secondary education, in specific, as a part of this virtuous circle of growth and development, not only serves an important transition from primary to higher education but provides key generic competencies to individuals which prove important across all domains of knowledge. It provides skills for early employment and the foundation for further education. Secondary education is a vital part of a virtuous circle of economic growth within the context of a globalised knowledge economy. According to UNESCO, expanding secondary schooling is “a minimum entitlement for equipping youth with the knowledge and skills they need to secure decent livelihoods in today’s globalized world” (Bokova, 2011). Secondary education also helps build social capital by raising the likelihood that citizens will participate in democratic institutions and will join community organizations and engage in politics.

About Chhattisgarh

Chhattisgarh, a central Indian state is the 7th largest state in the country with a total area of 135,195 sq.km. Raipur is the capital city. The state has 27 districts and these are divided in three regions: Northern region, Central Plains region and Southern region. Chhattisgarh is primarily a rural state with only 20% of its population (around 5.1 million people in 2011) residing in urban areas. According to the census of 2011, Chhattisgarh's literacy rate was 71.04% with female literacy at 60.59%. The services sector is the largest contributor to the state’s NSDP with a share of 49.61% followed by industry with 31.74% and agriculture with 18.65%. Table 1 indicates that around 1.2 crore people in Chhattisgarh fall below poverty line which is 48% of the state’s population. This number is far higher than the national figure of 29.8% of total population of India falling below poverty line. As per the UNDP Factsheet, Chhattisgarh fares poorly in prevalence of calorie undernourishment and underweight children under 5 years of age.

Table 1: Poverty Indicators of Chhattisgarh

Poverty and Hunger Indicators	Chhattisgarh(2009-10)	India (2009-10)
Poverty Headcount Ratio (%)	48.7	29.8
Total number of poor (in millions)	12.19	354.68
Year	2005	2005
Multidimensional Poverty Index (MPI)	0.367	0.283
Multidimensional Poverty Headcount (%)	69.7	53.7
Number of Multidimensional Poor (in millions)	17.9	612
Year	2005-06	2005-06
Prevalence of calorie undernourishment (%)	23.3	20
Prevalence of Underweight Children under 5 years of age (%)	47.6	42.5
Year	2007	2007
Global Hunger Index (GHI)	26.63	23.3
GHI Rank (out of 17)	14	

Source: Chhattisgarh - Economic and Human Indicators Factsheet available at: http://www.in.undp.org/content/dam/india/docs/chhattisgarh_factsheet.pdf

2. Secondary Education in Chhattisgarh

This section provides an overview of secondary education in the state of Chhattisgarh in terms of number of secondary schools, enrolment by gender and social group, teacher parameters and so on. The data of last four years i.e., from 2012-13 to 2015-16 is used to study the trend, but in some cases the latest data may not be available.

2.1. Access

As shown in Table 2, number of secondary schools in the state has marginally increased from 5995 in 2012-13 to 6268 in 2015-2016. The increase in number of secondary schools was only 0.71% in 2013-14, while it was 2.74% in 2014-15 and 1.03% in 2015-16.

Table 2 : Number of Secondary Schools in Chhattisgarh

Year	Number of secondary schools
2012-13	5995
2013-14	6038 (0.71%)
2014-15	6204 (2.74%)
2015-16	6268 (1.03%)

Source: Compiled from U-DISE Flash statistics for respective years.

Table 3 : Percentage of Schools established since 2006

	2012-13	2013-14	2014-15	2015-16
Chhattisgarh	18.60	13.56	15.84	17.34

Source: Compiled from U-DISE Flash statistics for respective years

Table 3 shows the percentage of secondary schools established since 2006. There has been gradual increase in the number of schools established from 2013-14 to 2015-16. However, there was a drop in the percentage of schools established from 18.60% in 2012-13 to 13.56% in 2013-14.

2.2. Equity

Equity has always been policy focus in the field of education. It is often used interchangeably with equality in terms of opportunity, resources, inputs processes, immediate and long term outcomes, but it is important to recognize the subtle difference that exists between the two. While equality implies equal access for all, equity ensures intervention to bring the marginalized at par with the rest of the society in terms of educational.

Table 4 : Total Enrolment in Secondary Schools

Year	Total enrolment
2012-13	884293
2013-14	982097 (11.06 %)
2014-15	992283 (1.03%)
2015-16	989703 (-0.26%)

Source: Compiled from U-DISE Flash statistics for respective years

Table 4 shows the total enrolment in secondary schools in Chhattisgarh. In 2013-14 there was 11.06% increase in enrolment and in 2014-15 there was an increase of 1.03% in enrolment. In 2015-16, there were 9,89,703 secondary school students in Chhattisgarh.

Gross enrolment ratio (GER) is the total enrolment in a specific level of education, regardless of age, expressed as a percentage of the eligible official school-age population corresponding to the same level of education in a given school-year. School-age population is population of the age group which officially corresponds to the relevant level of education. The Table 5 shows that the gross enrolment ratio (GER) in secondary schools in Chhattisgarh. The GER in 2015-16 is has decreased to 91.93 compared 101.82 in 2014-15. The GER in 2012-13 was 86.14 and it increased to 97.99 in 2013-14. In 2014-15, the GER decreased to 97.99.

Table 5 : Gross Enrolment Ratio

Year	Gross Enrolment Ratio (GER)
2012-13	86.14
2013-14	97.99
2014-15	101.82
2015-16	91.93

Source: Compiled from U-DISE Flash statistics for respective years

The Net Enrolment Ratio (NER) is defined as enrolment of the official age-group for a given level of education expressed as a percentage of the corresponding population. Table 6 shows NER in secondary schools in Chhattisgarh. It indicates that the Net Enrolment Ratio in the state has been gradually increasing year on year. The point to be noticed is the enrolment among girls as always been higher than boys in Chhattisgarh. In the year 2015-16, the Net Enrolment Ratio among boys is 54.46 while that of girls is 57.36.

Table 6 : Net Enrolment Ratio

2012-13	Boys	41.29
	Girls	41.69
2013-14	Boys	50.97
	Girls	52.82
2014-15	Boys	54.53
	Girls	57
2015-16	Boys	54.56
	Girls	57.36

Source: Compiled from U-DISE Flash statistics for respective years

Table 7: Enrolment by Social Group

	General	SC	ST	Other Backward Class
2012-13	8.29	15.26	27.35	49.10
2013-14	8.37	14.63	28.87	48.13
2014-15	8.19	14.73	28.77	48.32
2015-16	8.09	14.99	28.62	48.34

Source: Compiled from U-DISE Flash statistics for respective years

Table 7 shows the enrolment in Chhattisgarh by social group. Scheduled Tribes (STs) constitute 30.62% of the population in state while their enrolment is 28.62% in 2015-16. The enrolment ratio has decreased from 28.87 in 2013-14 to 28.62 in 2015-16. The enrolment ratio among Muslims which constitute around 2% of the state's population is 1.34 in 2015-16. The enrolment ratio among Muslims has decreased from 1.68 in 2012-13 to 1.34 in 2015-16. The enrolment ratio among OBCs which constitute 49% of state's population is 48.34 in 2015-16 which has decreased from 49.10 in 2012-13. Scheduled Castes (SCs) which form 12.8% of state's population has an enrolment ratio of 14.99 in 2015-16.

2.3. Teachers

This section analyses the teachers in secondary education in Chhattisgarh in terms of gender parity, qualification, and other parameters.

Table 8 : Number of Teachers in Secondary Schools by Gender

Year	Total number of teachers	Male (percent)	Female(percent)
2012-13	16,787	56.98	43.02
2013-14	29,322	55.81	44.19
2014-15	28,312	54.00	46.00
2015-16	29,492	53.55	46.45

Source: Compiled from U-DISE Flash statistics for respective years

As shown in Table 8 there were 29494 secondary school teachers in Chhattisgarh in 2015-16 out of which 53.55% are male and 46.45% are female. The percentage of male teachers is more than the percentage of female teachers in all years during 2012-13 to 2015-16. However the share of female teachers has increased from 43.02% in 2012-13 to 46.45 in 2015-16.

Table 9 : Percentage of Secondary School Teachers by Academic Qualification

	Below Graduation	Graduate	Post-Graduate	M.Phil	PhD / Post-Doctoral
2012-13	7.75	14.55	75.97	1.10	0.64
2013-14	4.66	12.49	80.43	1.04	0.47
2014-15	3.29	11.79	83.41	0.97	0.41
2015-16	1.48	12.23	84.87	0.96	0.46

Source: Compiled from U-DISE Flash statistics for respective years

Table 9 shows the percentage of secondary school teachers by their academic qualification. More than 98% of the teachers possess a qualification of graduation or above. More than 85% of the teachers have a post-graduate degree or above. The share of teachers with post-graduation has increased from 75.97% in 2012-13 to 84.87% in 2015-16. The share of teachers qualified below graduation has decreased from 7.75% in 2012-13 to 1.48% in 2015-16. Teachers with post-graduation constitute the highest share followed by teachers with graduation, below-graduation and M.Phil. Teachers with PhD or post-doctoral qualification have the least share with less than 1%.

Table 10 : Percentage of Professionally Qualified Teachers

Year	Percentage of professionally qualified teachers
2012-13	60.16
2013-14	63.54
2014-15	66.49
2015-16	70.57

Source: Compiled from U-DISE Flash statistics for respective years

Table 10 shows the percentage of professionally qualified teachers in secondary schools in Chhattisgarh. In 2015-16, 70.57% of the secondary school teachers were professionally qualified compared to 66.49% in 2014-15. Compared to 60.16% in 2012-13 there has been more than 10% increase in the number of professionally qualified teachers in 2015-16.

2.4. Management

This section deals with the classification of secondary schools, teachers and students by the management of the schools. One can come across both private and state-run schools in Chhattisgarh. The government run schools are mostly affiliated to the Chhattisgarh Board of Secondary Education. Students can also join schools affiliated to the Central Board of Secondary Education (CBSE) or Council for the Indian School Certificate Examination (CISCE).

Table 11 : Management-wise Percentage of Secondary Schools

Management	2012-13	2013-14	2014-15	2015-16
Department of Education	41.18	38.37	38.73	67.29
Tribal/Social Welfare Department	21.87	29.48	28.68	0
Local Body	7.21	0.51	0.48	0
Private Aided	1.38	1.62	1.61	1.63
Private Unaided	21.10	28.75	29.48	30.20
Other Government Managements	0.53	0.25	0.08	0
Central Government	6.19	0.99	0.82	0.85
Unrecognised	0.15	0	0	0
Recognized Madrasas	-	0	0	0.03
Unrecognised Madrasas	-	0.02	0.11	0
Other Managements	-	0	0	0

Source: Compiled from U-DISE Flash statistics for respective years

As seen in Table 11, 67.29% of secondary schools in the state are run by department of education. Private unaided schools constitutes 30.20% of the secondary schools followed by 1.63% private aided schools and 0.85% schools run by the central government. Until 2014-15 around 30% of the secondary schools were managed by tribal/social welfare department or local bodies which have now been shifted under state education department. Similar to the trend in other states, the share of private unaided schools is increasing year on year.

Table 12 : Percentage of Enrolment by Management at Secondary School Level

Management	2012-13	2013-14	2014-15	2015-16
Department of Education	53.40	49.75	49.78	76.99
Tribal/Social Welfare Department	21.46	28.05	27.04	0
Local Body	4.71	0.73	0.65	0
Private Aided	1.85	2.25	2.29	2.20
Private Unaided	12.83	18.03	19.33	20.02
Other Government Managements	0.21	0.13	0.07	0
Central Government	3.30	0.88	0.77	0.78
Unrecognised	0.07	0	0	0
Recognized Madrasas	-	0	0	0
Unrecognised Madrasas	-	0	0.06	0
Other Managements	2.17	0	0	0

Source: Compiled from U-DISE Flash statistics for respective years

Table 12 shows the distribution of secondary schools in Chhattisgarh by type of management. 76.99% of secondary schools in the state are run by state education department followed by private unaided schools which forms 20.02% of the secondary schools. The 27.04% of the schools run by tribal welfare department in 2014-15 has been moved under the state education department in 2015-16. The share of private unaided schools has increased from 12.83 in 2012-13 to 20.02 in 2015-16. Private aided schools constitute 2.20% of the secondary schools in state followed by central government run schools which constitute around 0.78%.

3. Quality of Secondary Education

The state government has undertaken a number of innovative programmes for secondary school students. This includes: (1) Interactive Voice Response based career counselling, psychometric testing and guidance service on a pilot basis in 1000 schools. (2) Notification of Vocational Education as a compulsory subject at the secondary level. This section discusses the quality of secondary education in relation to infrastructure, Repetition, drop-out and learning achievement.

3.1. Infrastructure

Table 13 shows the availability of basic infrastructure like building, playground, drinking water, library and separate toilets for boys and girls in secondary schools in Chhattisgarh.

Table 13 : Status of Basic Infrastructure in Secondary Schools

Year	Building	Playground	Drinking water facility	Library	Boy's toilet	Girl's toilet
2012-13	91.06	58.50	94.25	86.99	68.04	72.04
2013-14	95.96	65.88	95.93	88.39	87.91	91.94
2014-15	96.15	66.80	97.08	93.09	87.54	91.16
2015-16	96.73	68.99	98.53	93.81	94.21	98.03

Source: Compiled from U-DISE Flash statistics for respective years

The status of basic infrastructure has improved gradually over the years. In 2015-16, 96.73% of the secondary schools had building, 68.99% of the schools had a playground, 98.53% of the schools had a drinking water facility, 93.81% of the schools had library, 94.21% of the schools had a separate boy's toilet and 98.03% of the schools had separate girl's toilet.

Table 14 : Status of Laboratory and ICT Infrastructure in Secondary Schools

Year	Integrated science laboratory	Electricity and computer	Computer	Computer with internet	Student-classroom ratio (SCR)
2012-13	27.19	NA	15.20	5.70	61
2013-14	34.56	NA	34.56	11.41	59
2014-15	43.54	40.26	43.25	16.28	53
2015-16	62.32	44.42	46.41	19.81	50

Source: Compiled from U-DISE Flash statistics for respective years

Table 14 shows the status of Information and Communication Technology (ICT) infrastructure, availability of integrated science lab and student to classroom ratio in secondary schools in Chhattisgarh. In 2015-16, 62.42% of the schools had an integrated science lab, 44.42 schools had both computers and electricity supply, 46.41% of the schools had computers, 19.18% of the schools had computer with internet connection and the average student to classroom ratio was 50.

3.2. Repetition and Drop-outs

Repeaters are pupils from a cohort enrolled in a given grade at given school years who study in the same grade in the following school year.

Table 15 : Percentage Repeaters by Social Group

	General	SC	ST	OBC	Muslim
2012-13	5.80	15.54	33.12	45.54	1.31
2013-14	5.05	15.19	35.76	44.00	1.24
2014-15	5.24	15.37	34.50	44.89	1.22
2015-16	4.81	15.96	33.94	45.30	1.03

Source: Compiled from U-DISE Flash statistics for respective years

Table 15 shows the percentage of repeaters in secondary schools by social group. Students from OBCs constitute 45.30% of repeaters in 2015-16 followed by ST which is 33.94%, SC which is 15.96%, General which is 4.81% and Muslims which is 1.03%.

Table 16 : Average Annual Drop-out Rates

Boys			Girls			Total		
2012-13	2013-14	2014-15	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15
14.82	24.10	22.62	14.89	22.72	19.92	14.86	23.41	21.26

Source: Compiled from U-DISE Flash statistics for respective years

Table 16 shows the average annual drop-out rate in secondary schools in Chhattisgarh. The point to be noticed is that boys have higher drop-out rate compared to girls in two of the three years studied. The drop-out rate among boys in 2014-15 is 22.62 whereas among girls it is 19.92. The overall drop-out rate in the state is 21.26 in 2014-15 which has increased from 14.86 in 2012-13.

Table 17 : Average Annual Drop-out Rate by Social Group

	General	SC	ST	OBC	Muslim
2013-14	0.9	24.41	27.22	22.50	24.97
2014-15	11.49	21.51	24.93	20.36	21.17

Source: Compiled from U-DISE Flash statistics for respective years

Table 17 shows the average annual drop-out rate in secondary schools by social group. In 2014-15, STs have the highest drop-out rate of 24.93 followed by SC which is 21.51, Muslims which is 21.17, OBC which is 20.36 and General category has the least drop-out rate of 11.49. The drop-out rate in 2014-15 has decreased in all social groups compared to 2013-14, except for General category which has increased by more than 10%.

3.3. Learning Achievement

Achieving good quality educational outcomes for all is the most cherished objective of a democratic country like India. It is important for all students to attain certain specified and valued learning standards after a period of 10 years of schooling, irrespective of their diverse social, cultural and economic backgrounds. In light of this, the Ministry of Human Resource Development (MHRD) had entrusted the Educational Survey Division of the National Council of Educational Research and Training (NCERT) to conduct a nationwide achievement survey of students at the end of Class VIII. The survey investigates the student achievement in five subjects: English, Mathematics, Social Science, Science and Modern Indian Language.

Table 18 : Subject-wise Mean Achievement Score in Class VIII

	English	Mathematics	Science	Social Science
Chhattisgarh	245	238	244	247
India	247	245	251	247

Source: NCERT (2014), NAS Class VIII, 2014(Cycle 3)

The above Table 18 shows the achievement level of the students in Chhattisgarh in Class 8 exams compared to national average.

- The average achievement score of Chhattisgarh (245) in English is not significantly different to that of the overall national achievement score (247).
- The average achievement score of Chhattisgarh in Mathematics (238) is significantly below that of the overall national achievement score (245).
- The average achievement score of Chhattisgarh in Science (244) is significantly below that of the overall national achievement score (251).
- The average achievement score of Chhattisgarh in Social Science (247) is not significantly different to that of the overall national achievement score (247).

3.4. Teacher Involvement in Non-teaching Work

There are several non-teaching functions within the school including administrative support, organising events, managing mid-day meals, managing construction, collecting and maintaining data about school students, organising events, facilitating visits of officials, distribution of uniforms, books, etc. These are, typically, functions of the administration, but given the fact that in most states, support staff has not been appointed in government schools.

Studies have shown us that science and mathematics teachers are more likely to be deputed to these non-teaching positions, because of their ability to manage numbers and data. When teachers are unable to get a transfer of their choice or when they have missed their chance they arrange for a deputation to their preferred location through personal networking. Those teachers get deputed to work in the SSA / RMSA Directorate, or sent to SCERT or CHTs (Ramachandran, 2015).

Table 19 : Percentage of teachers involved in non-teaching assignment

2012-13		2013-14		2014-15	
Teachers	Days	Teachers	Days	Teachers	Days
0.60	15	3.54	9.73	1.20	8

Source: Compiled from U-DISE Flash statistics for respective years

Table 19 shows the percentage of secondary school teachers involved in non-teaching assignments in Chhattisgarh. 1.20% of teachers were involved in non-teaching assignment in 2014-15 compared to 3.54% in 2013-14 and 0.60% in 2012-13. The average number of days involved in non-teaching assignment has decreased from 15 days in 2012-13 to 8 days in 2014-15.

3.5. Financing Secondary Education in the State

This section deals with the education expenditure budget of state. However this section at present is based on the actuals of 2010-11 and 2011-12, Revised Estimates (R.E) of 2012-13 and Budget Estimate (B.E) of 2013-14. More recent data would give a better understanding of the education expenditure in Chhattisgarh.

Table 20, shows that there has been an increase in amount spent by Chhattisgarh government on education as a whole, but what is worth noting is that the share of plan expenditure has always been higher than the non-plan expenditure. However, the share of plan expenditure which was 63.35% in 2010-11 has decreased to 56.97% in 2013-14.

Table 20 : Total Plan Budgeted Expenditure on Education by all Departments (Rupees in Thousands)

Year	Total Expenditure on Education	Percentage of Plan Expenditure	Percentage of Non-Plan Expenditure
2010-11 (Actual)	3,34,34,853	63.35	36.65
2011-12 (Actual)	5,33,20,111	55.03	44.97
2012-13 (R.E)	7,06,95,200	60.59	39.41
2013-14(B.E)	8,30,71,182	56.97	43.03

Source: Compiled from Analysis of Budgeted Expenditure on Education 2010-11 to 2013-14

Table 21 shows that, in comparison to elementary education, share of secondary education in the state budget has been nearly half of elementary education in all the 3 years studied. However, the spending on secondary education in 2013-14 has increased to 32.85% from 26.24% in 2012-13.

Table 21 : State Public Spending on Elementary versus Secondary Education (Rupees in Thousands)

Year	Spending on Elementary Education	Spending on Secondary Education
2011-12 (Actual)	2,67,71,243 (64.60)	1,08,75,798.00 (26.24)
2012-13 (R.E)	3,52,13,930.00 (63.02)	1,47,75,233.00 (26.24)
2013-14 (B.E)	4,18,67,880.00 (56.92)	2,41,65,232.00 (32.85)

Source: Compiled from Analysis of budgeted Expenditure on Education 2011-12 to 2013-14, MHRD

The below Table 22 gives the breakup of public spending on secondary education under various heads. The major expenditure has been made under government secondary schools in all the years studied. The point to be highlighted, is that Chhattisgarh has not incurred any expenditure on direction, inspection and administration in all the three years studied. The amount spent on teacher's training has decreased from 0.9% in 2012-13 to 0.6% in 2013-14. Chhattisgarh has not spent on non-formal education at all.

Table 22 : Heads of Public Spending on Secondary Education (Rupees in Thousands)

Heads of expenditure	2011-12 (Actual)	2012-13 (R.E)	2013-14 (B.E)
Direction, Inspection & Administration	-(0.00)	-(0.00)	-(0.00)
Government Secondary Schools	66,78,681.00 (61.41)	80,54,853.00(54.52)	1,56,01,910.00(64.56)
Assistance To Non-Govt. Secondary Schools	6,99,759.00 (6.43)	8,46,030.00 (5.73)	9,18,950.00 (3.80)
Scholarships	58,965.00 (0.54)	2,20,830.00 (1.49)	1,62,400.00 (0.67)
Teacher's Training	1,04,537.00 (0.96)	1,32,850.00 (0.90)	1,52,872.00(0.63)
Non Formal Education	- (0.00)	- (0.00)	- (0.00)
Other Expenditure	1,23,356.00 (1.13)	2,32,000.00 (1.57)	2,62,000.00 (1.08)

Source: Compiled from Analysis of budgeted Expenditure on Education 2011-12 to 2013-14, MHRD

4. Rashtriya Madhyamik Shiksha Abhiyan (RMSA)

Rashtriya Madhyamik Shiksha Abhiyan (RMSA) is a centrally sponsored scheme and has been implemented in Chhattisgarh since 2009-10 with the purpose of making secondary education of good quality available, accessible and affordable to all young persons in the age group 15-16 years. The scheme envisages provision of one secondary school within five kilometres of every habitation.

During the 11th Plan, RMSA sanctioned the following: opening of new secondary schools (1351), strengthening of existing secondary schools (1641), sanctioning additional classrooms (3297), science lab (1425), computer room (1508), libraries (1489), art/craft/culture rooms (1595), toilet blocks (1441), drinking water facilities (943), minor repair (6234), major repair (325) and residential quarters for teachers (405).

During the same period, 8,824 new teachers' posts were sanctioned and 1,408 new teachers were recruited. A total of 53,935 secondary school teachers were sanctioned to receive training, and special training was provided to 9,948 students.

Prior to 2009 when it was merged with RMSA, the ICT@School was a separate centrally sponsored scheme. It was launched in December 2004, and was revised in 2010, to promote computer enabled learning and usage of ICT in teaching in government and government aided secondary and higher secondary schools with emphasis on Educationally Backward Blocks (EBB) and areas with concentration of SC/ST/Minority/weaker sections. Financial assistance for procuring computers and other ICT related infrastructure was given. A grant of Rs. 6.4 lakhs (non-recurring) and Rs. 2.7 lakhs (recurring) per school was given to the states with the Centre-State contribution being 75:25. In 2008, 800 schools were covered in Chhattisgarh under this scheme and Rs 1,200 lakhs was released for the purpose.

Model School Scheme was launched in 2007 with the aim to provide quality education to talented rural children through setting up of 6,000 model schools as benchmark of excellence at block level at the rate of one school per block. A total of 74 Educationally Backward Blocks (EBB) were identified in Chhattisgarh for implementing this scheme and Rs. 83.86 crore was released for its implementation (Rs.22.65 crore for 20 schools in 2009-10, Rs.58.89 crore in 2010-11 for 52 schools and Rs.2.32 crore in 2011-12 for 02 schools). In 2016, the state government decided to run the Model Schools in Public-Private Partnership (PPP) Mode.

In 2015-16, 11,645 crores was the total budget allocation for education, while in 2016-17, this increased to 12,921 crores which is an increase of 11%. Allocation of Rs 2,200 crore was made for Sarva Shiksha Abhiyaan and Rs 682 crore for Madhyamik Shiksha Abhiyaan. Allocation of Rs 80 crore was proposed to provide laptops and tablets to 74,000 students, under the Chhattisgarh Yuva Kranti Yojana in the 2016-17 budget.

The budget also introduced a new measure of direct transfer of salaries into the accounts of school teachers and workers, at the district level which would streamline the efficiency of the salary payments of teachers and others. Rs 1,056 crore allocated for the Integrated Child Development Scheme.

In the state budget for 2016-17, eight new Industrial Training Institute (ITI) Colleges are proposed to be established. Further 1,136 new seats in ITI colleges will be created. Swami Vivekanand Gurukul Unnayan Yojana is proposed to be started with an allocation of Rs. 119 crore. Construction of 'Ashram Shaalas', hostels, playgrounds, etc., will be undertaken as part of the scheme.

Technology Readiness for CLIx intervention in Chhattisgarh

II. Technology Readiness for CLIx intervention in Chhattisgarh

Timeline	Activities
Aug-Sep, 2014	First meeting between RMSA, Chhattisgarh Govt., UNICEF & TISS. Preliminary survey conducted in 3 districts.
Feb 2015	As per suggestion from RMSA 30 schools in Raipur and Bilaspur district were surveyed for ICT infrastructure mapping.
April 2016	In collaboration with SCERT and District Education Office, 138 schools were surveyed by TISS for infrastructure mapping in Dhamtari (68 schools) and Bilaspur (68 schools)
June 2016	30 schools from Dhamtari were recommended by SCERT, DEO Office-Dhamtari for year one CLIx Implementation.
Nov 2016	RMSA agreed for installation of additional hardwares by TISS to the selected 30 school labs.
Nov 2016	School computer lab peripherals were repaired and fixed with the help of NIIT.
Dec 2016	Additional hardware/peripherals were provided by CLIx to the selected schools.

Source: Dey, Subroto (2014) A Study on the status of ICT programme in the State of Chhattisgarh and CLIx internal reports

5. Overview of CLIx

In April 2016, Rashtriya Madhyamik Shiksha Abhiyan (RMSA), State Council of Educational Research and Training (SCERT) entered into a partnership with Tata Institute of Social Sciences for implementation of CLIx in Chhattisgarh. Prior to and following the agreement, various activities have been conducted in collaboration with the SCERT, RMSA and TISS which is the field implementation partner for CLIx in the state. In the current three-year Phase-1 (2015-2018) of the CLIx programme, 30 schools in Dhamtari district have been selected for implementation.

This part of the report seeks to

- Give a brief overview of ICT@School scheme in Chhattisgarh.
- Provide a snapshot of the process followed till now to select the schools for intervention.
- Estimate the type of infrastructural requirements that are needed in addition to the infrastructure already present in the selected secondary schools of Chhattisgarh to effectively run the CLIx intervention.

6. ICT@Schools Scheme in Chhattisgarh

Recognising the critical role of Information and Communication Technology (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 one to three percent of the budget be spent on providing computers in secondary and senior secondary schools over the subsequent five years (NCERT, 2014). Following this recommendation, in 2004, the government launched its flagship ICT scheme for schools, the 'ICT@Schools', 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. 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 central government and the state governments CLIx has leveraged the ICT@School scheme and chosen to intervene in the schools that have received ICT infrastructure under the scheme. Yet, there are differences in the provisions under the scheme and the requirements to effectively implement CLIx. Speakers, camera and headsets, LAN interface, uninterrupted power supply and separate for labs physics, chemistry and biology are additional requirements for CLIx intervention. Schools covered under ICT Phase 1 and Phase 2 were mostly senior secondary schools. For the CLIx programme, schools covered under Phase 2 have been selected as the availability of infrastructure in these schools is comparatively better.

Under the PPP Model, the government has provided a room in each school with a minimum area of 300 Sq. feet for the setting up of a computer lab and the company has furnished the room with infrastructure which includes vinyl flooring, drop secondary ceiling (false ceiling) with thermocol, 11 computers (monitors), 3 CPUs, 1 LCD monitor, 20 plastic chairs & 10 wooden tables, 1 Reliance internet dongle and wiring of the lab etc. During the field visits, it was observed that computer lab can accommodate up to 20 students at a time. Each class has been divided into sections and schedule for each section has been prepared. However, one section can have maximum two computer classes in a week, since the infrastructure can only accommodate limited number of students. This also prevents the schools from using the Computer Aided Learning (CAL) for subjects such as Mathematics, Sciences, English and Social Studies, since; the infrastructure available in the computer lab is insufficient for teaching a class of more than 20 students. It was also observed that in some schools, the science labs have been converted into computer labs, which compromises the quality of science teaching in those schools. Though the schools have been provided with a minimum 256 Kbps bandwidth internet dongles, yet these dongles are not functioning and there is no internet connection in the computer labs of the schools. Most schools have no internet connection at all. Besides, the conditions of the computer labs vary across schools. As per the agreement the area of the computer labs is to be 300 Sq. feet, therefore, where the schools have provided bigger rooms for the Computer Labs, only part of the bigger rooms (rooms with more than 300 Sq. feet) has been provided with Vinyle flooring and 'false secondary' ceilings.

Physical maintenance of the computer labs, in schools selected for intervention in Dhamtari, throughout the year and charges for internet usages are to be provided by the company (NIIT). Apart from the physical infrastructure, all schools have been provided with a computer faculty to teach basic computer lesson,

MS Office, Hindi and English typing and drawings. The private agency has also provided the schools with two CAL (Computer Aided Learning) CDs with lessons on 'hard spots' on science, English and social studies for class IX, X and XI, XII. In case of any problem with the computers, the schools can contact the 'IT Care' persons for problem solving and maintenance. The mobile numbers of the IT Care persons are available with the schools for specific areas.

The implementing private agency is providing training to the teachers in batches of five teachers from each school. During the visit, the teacher training programme was observed in the government DCEC (District Computer Education Centre) at the Block level in Government Multipurpose Schools. The teachers are being provided training on basic computer knowledge like MS Office (Word, Excel, Power point, accessing internet, etc.). The training to teachers will be provided every year for five years. This was intended toward the transfer of the BOOT model and enabling the teachers in using ICT in schools. Apart from training to the school teachers, NIIT is also providing three days of training to the computer faculties recruited by them.

The performance of the NIIT run programme is evaluated by the Department of Public Instruction (DPI). The Principals of the schools submit a report every quarter to the DEO (District Education Officer) on the performance of the computer lab, maintenance and on the teaching by the NIIT faculty. The DEO after collating all the reports from the schools evaluates them and sends the reports to the DPI every quarter in Raipur.

7. ICT Infrastructure

Technology is the backbone for the implementation of CLIx. It is based on the premise that use of appropriate technology in curriculum development, pedagogy and teacher professional development can transform learning experience and improve quality of education.

Table 23 shows the difference between infrastructure provisions under ICT@School scheme and technological requirements required for CLIx intervention. Multimedia devices like speakers, camera and headsets, LAN interface, uninterrupted power supply and separate labs physics, chemistry and biology are additional requirements for CLIx intervention.

Table 23 : Infrastructure Provisions under revised ICT@School Scheme and Requirements for CLIx

Requirement	Revised ICT@School scheme	CLIx requirements	Remarks
Hardware 	10 PCs or 10 nodes connected through a server per school, printers, projector, etc Keyboards customised for use in the regional languages.	- 3 CPUs working in case of NComputing or at least 7 computers - Keyboard, - Projector, - Printer/Scanner, - Audio system, - Camera, headsets, Spilitters.	Multimedia devices like camera, audio system, headsets are additional requirements for CLIx.
Connectivity 	Broadband internet connection of at least 2 Mbps bandwidth or connection of lower bandwidth with plan to upgrade in future. Wireless links would also be explored.	Functional Internet connection with a speed of at least 2Mbps or 3G. Schools must have LAN interface or at least a possibility of having such a setup.	Internet connection of 3G or above quality is required with LAN interface for CLIx.
Power Supply 	Broadband internet connect Wherever the power supply is unreliable, it is proposed to provide assistance for purchase of a generator, as a backup only and also its recurring cost, subject to a maximum of Rs.1000 per month, in addition to Rs.1000/- per month for the electricity charges. In areas where there is no power supply, solar generated power should be made use of.	UPS present with all PCs.	Uninterrupted power supply is necessary for CLIx intervention.
Computer Room/Lab 	The computers would be installed in one of the safe rooms in the school. If such rooms are not available, the need can be met from the scheme (RMSA) in case of Government schools.	The school has a computer lab/room. If not, there should be a provision or possibility of creating a space that can be used as a computer lab/room.	Most of the schools have computer lab.
Science Lab 	No provision under ICT@School scheme	The school has functional science lab(s) with required equipments and supplies. Preferably three different labs for Physics, Chemistry and Biology.	All the schools selected for CLIx have combined science lab.

The central government initially recommended that States with limited capacity adopt the BOO/BOOT (Build Own Operate and Transfer). 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 computer teachers.

Studies have reported that 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 (NCERT, 2014) .

Table 24 :Year-wise Detail of Schools approved under ICT in Chhattisgarh

Year	Number of Schools
2005-06	-
2006-07	100
2007-08	200
2008-09	800
2009-10	1100
2010-11	-
2011-12	-
2012-13	0
2013-14	-
2014-15	-
Total	2200

Source: From “Schools approved” accessed from http://mhrd.gov.in/sites/upload_files/mhrd/files/upload_document/Approal%20of%20school%20ICT.xlsx on 10th March, 2017

So far 2,200 schools have been approved under ICT@School scheme in Chhattisgarh. There was a delay in implementation of ICT in 1247 schools which were approved in 2009-10 and the state proposed to surrender the same. In the Annual Work Plan and Budget for 2016-17, 1246 eligible schools were approved for ICT as per scheme norms @ Rs.6.40 lakhs per school with total outlay of Rs.7,974.40 lakh.

The ICT@School 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. Table 25 indicates the student computer ratio. Section-wise and batch wise allotment of computer teaching hours should be managed efficiently to provide computer access to all students.

Table 25 : Student to Computer Ratio in CLIx Intervention Schools in 2015-16

Sl. no	Name of the school	Grade 9 strength	No. of sections in grade 9	No. of computers	Student computer ratio (SCR) for a section
1	Dr.S.R.DewanganGovt.H.S.School, Dhamtari	104	2	11	4.73
2	Govt.Model Girls H.S.School Dhamtari	250	4	11	5.68
3	Govt.High School Gokulpur Ward Dhamatri	122	1	11	11.09
4	Govt.H.S.School Sambalpur	140	2	11	6.36
5	Govt.H.School Shankardah	84	2	11	3.82
6	Govt.High School Rudri	135	2	11	6.14
7	Govt.H.S.School Khthouli	118	1	11	10.73
8	Govt.H.S.School Aamdi	145	2	11	6.59
9	Govt.H.S.School Doma	129	2	11	5.86
10	Govt.H.S.School Kharenga	100	2	11	4.55
11	Govt.H.S.School Bagtarai	68	1	11	6.18
12	Govt.H.S.School Kurra	90	1	11	8.18
13	Govt.H.S.School Gopalpuri	97	1	11	8.82
14	Govt.H.S.School Maroud	108	1	11	9.82
15	Govt.H.S.School Darba	105	2	11	4.77
16	Govt.H.S.School Sivanikala	133	2	11	6.05
17	Govt.H.S.School Ji.Jamgoan	59	1	11	5.36
18	Govt.H.S.School Bhatagaon	72	1	11	6.55
19	Govt.H.S.School Sirri	136	2	11	6.18
20	Govt.H.S. School Charra	115	2	11	5.23
21	Govt.High School Thooha	94	2	11	4.27
22	Govt.H.S.School Atang	57	1	11	5.18
23	Govt.H.S.School Gatapar	121	2	11	5.50
24	Govt.High School Rampur	131	2	11	5.95
25	Govt.H.S.School Kachana	124	2	11	5.64
26	Govt.H.S.School Bhendara	79	1	11	7.18
27	Govt.H.S.School Joratarai	69	1	11	6.27
28	Govt.H.S.School Korra	60	1	11	5.45
29	Govt.H.S.School Nari	140	2	11	6.36
30	Govt.H.S.School Soram	227	2	11	10.32
	Average	113.73	1.66	11	6.49

Table 26 : Gaps in ICT infrastructure in selected schools before CLIx intervention

Sl. No.	SCHOOL	Server/Internal Hard drive	Computers	N-Computing Device	Functional LAN Setup	Internet	Display	Headphones with Mic	Audio Splitters	Speaker	Printer	Power backup
1	Dr.S.R.Dewangan Govt.H.S.School, Dhamtari	×	√	√	√	√	√	×	×	√	√	√
2	Govt.Model Girls H.S.School Dhamtari	×	√	√	×	√	√	×	×	√	√	√
3	Govt.High School Gokulpur Ward Dhamatri	×	√	√	√	√	√	×	×	√	√	√
4	Govt.H.S.School Sambalpur	×	√	√	√	√	√	×	×	√	√	√
5	Govt.H.School Shankardah	×	√	√	×	×	√	×	×	√	×	√
6	Govt.High School Rudri	×	√	√	×	√	√	×	×	√	√	×
7	Govt.H.S.School Khthouli	×	√	√	√	√	√	×	×	√	√	√
8	Govt.H.S.School Aamdi	×	√	√	×	√	√	×	×	√	√	√
9	Govt.H.S.School Doma	×	√	√	×	√	√	×	×	√	√	√
10	Govt.H.S.School Kharenga	×	√	√	×	√	√	×	×	√	√	√
11	Govt.H.S.School Bagtarai	×	√	√	×	√	√	×	×	√	√	√
12	Govt.H.S.School Kurra	×	√	√	×	√	√	×	×	√	√	√
13	Govt.H.S.School Gopalpuri	×	√	√	×	√	√	×	×	√	√	√
14	Govt.H.S.School Maroud	×	√	√	√	√	√	×	×	√	×	√
15	Govt.H.S.School Darba	×	√	√	×	√	√	×	×	√	√	√
16	Govt.H.S.School Sivanikala	×	√	√	√	√	√	×	×	√	√	√
17	Govt.H.S.School Ji.Jamgoan	×	√	√	×	√	√	×	×	√	√	√
18	Govt.H.S.School Bhatagaon	×	√	√	√	√	√	×	×	√	√	√
19	Govt.H.S.School Sirri	×	√	√	×	√	√	×	×	√	√	√
20	Govt.H.S. School Charra	×	√	√	√	√	√	×	×	√	√	√
21	Govt.High School Thooha	×	√	√	×	√	√	×	×	√	√	√
22	Govt.H.S.School Atang	×	√	√	√	√	√	×	×	√	√	√
23	Govt.H.S.School Gatapar	×	√	√	×	√	√	×	×	√	√	√
24	Govt.High School Rampur	×	√	√	×	√	√	×	×	√	√	√
25	Govt.H.S.School Kachana	×	√	√	√	√	√	×	×	√	√	√
26	Govt.H.S.School Bhendara	×	√	√	×	√	√	×	×	√	√	√
27	Govt.H.S.School Joratarai	×	√	√	×	√	√	×	×	√	×	√
28	Govt.H.S.School Korra	×	√	√	√	√	√	×	×	√	√	√
29	Govt.H.S.School Nari	×	√	√	×	√	√	×	×	√	√	×
30	Govt.H.S.School Soram	×	√	√	√	√	√	×	×	√	×	√

Source: CLIx internal survey, July-Nov, 2016

Table 26 indicates the gaps in ICT infrastructure in the schools selected for CLIx intervention in Dhamtari district of Chhattisgarh. The gaps are mapped for 11 key computer hardware specifications necessary for CLIx intervention. The marked × indicates the gap of specific hardware in corresponding school and the ones marked √ indicates presence of computer hardware in the school. Lack of internet connectivity and non-availability of multimedia devices like headphones and speakers are the most commonly found gaps across all schools selected for intervention.

Table 27 indicates the status of ICT infrastructure in the schools selected for CLIx intervention after upgradation. The gaps are mapped for 11 key computer hardware specifications necessary for CLIx intervention. The marked × indicates the gap of specific hardware in corresponding school and the ones marked √ indicates presence of computer hardware in the school.

CLIx will provide a 500GB Hard disk for one of the CPUs in every school. This drive will be used to make the CPU function as school server. All the 30 schools in Dhamtari are in connectivity zone. 2 schools have BSNL Broadband connection, 20 schools have Idea 3G (1GB) Dongle, 8 schools are connected to internet using Airtel 3G (1 GB) internet dongle.

Table 27 : Status of ICT infrastructure in selected schools after upgradation

Sl. No.	SCHOOL	Server/Internal Hard drive	Computers	N-Computing Device	Functional LAN Setup	Internet	Display	Headphones with Mic	Audio Splitters	Speaker	Printer	Power backup
1	Dr.S.R.Dewangan Govt.H.S.SchoolDhamtari	√	√	√	×	√	√	√	√	√	√	√
2	Govt.Model Girls H.S.School Dhamtari	√	√	√	×	√	√	√	√	√	√	√
3	Govt.High School Gokulpur Ward Dhamatri	√	√	√	×	√	√	√	√	√	√	√
4	Govt.H.S.School Sambalpur	√	√	√	×	√	√	√	√	√	√	√
5	Govt.H.School Shankardah	√	√	√	×	√	√	√	√	√	√	√
6	Govt.High School Rudri	√	√	√	×	√	√	√	√	√	√	√
7	Govt.H.S.School Khthouli	√	√	√	×	√	√	√	√	√	√	√
8	Govt.H.S.School Aamdi	√	√	√	×	√	√	√	√	√	√	√
9	Govt.H.S.School Doma	√	√	√	×	√	√	√	√	√	√	√
10	Govt.H.S.School Kharenga	√	√	√	×	√	√	√	√	√	√	√
11	Govt.H.S.School Bagtarai	√	√	√	×	√	√	√	√	√	√	√
12	Govt.H.S.School Kurra	√	√	√	×	√	√	√	√	√	√	√
13	Govt.H.S.School Gopalpuri	√	√	√	×	√	√	√	√	√	√	√
14	Govt.H.S.School Maroud	√	√	√	×	√	√	√	√	√	√	√
15	Govt.H.S.School Darba	√	√	√	×	√	√	√	√	√	√	√
16	Govt.H.S.School Sivanikala	√	√	√	×	√	√	√	√	√	√	√
17	Govt.H.S.School Ji.Jamgoan	√	√	√	×	√	√	√	√	√	√	√
18	Govt.H.S.School Bhatagaon	√	√	√	×	√	√	√	√	√	√	√
19	Govt.H.S.School Sirri	√	√	√	×	√	√	√	√	√	√	√
20	Govt.H.S. School Charra	√	√	√	×	√	√	√	√	√	√	√
21	Govt.High School Thooha	√	√	√	×	√	√	√	√	√	√	√
22	Govt.H.S.School Atang	√	√	√	×	√	√	√	√	√	√	√
23	Govt.H.S.School Gatapar	√	√	√	×	√	√	√	√	√	√	√
24	Govt.High School Rampur	√	√	√	×	√	√	√	√	√	√	√
25	Govt.H.S.School Kachana	√	√	√	×	√	√	√	√	√	√	√
26	Govt.H.S.School Bhendara	√	√	√	×	√	√	√	√	√	√	√
27	Govt.H.S.School Joratarai	√	√	√	×	√	√	√	√	√	√	√
28	Govt.H.S.School Korra	√	√	√	×	√	√	√	√	√	√	√
29	Govt.H.S.School Nari	√	√	√	×	√	√	√	√	√	√	√
30	Govt.H.S.School Soram	√	√	√	×	√	√	√	√	√	√	√

Source: CLIx internal survey, July-Nov, 2016

Table 28 : Budget Summary for procurement of ICT infrastructure

Sl.no	Hardware	Cost per unit (Rs)	No of units	Total cost in Rs
1	Headphone	550	22	12,100
2	Audio Splitters	50	11	550
3	500 GB internal Hard Drive	1800	1	1800
			Cost per school	Rs. 14,450
			Total cost for 30 schools	Rs.4,33,500

Source: CLIx internal documents, August, 2016

Table 28 shows the number of units of each device required for CLIx intervention and its cost. CLIx has now procured the entire necessary infrastructure at a cost of Rs.4,33,500 spending Rs. 14,450 on each of the 30 schools selected for intervention.

CLIx in Chhattisgarh

III. CLIx in Chhattisgarh

The CLIx programme started in Dhamtari district from June 2016 and is being implemented in 30 government schools. A number of preparatory activities were undertaken before launching CLIx in schools. Based on an infrastructure mapping survey undertaken in the intervention schools, infrastructure gaps were identified in the computer labs. This gap was filled by CLIx in November 2016, by ensuring that all the ICT requirements needed to roll out the programme were provided in the 30 schools selected for intervention (see Section 2 on technology readiness for implementation of CLIx). A baseline study was done in a sample of 20 treatment schools and 10 control schools using 11 survey tools administered to students, teachers, principals and officials.

8. CLIx Implementation

The academic year 2016-17 was a pivotal year for CLIx in Chhattisgarh. Throughout this year we were able to work closely with the RMSA and SCERT to realise several key milestones. The implementation of CLIx programme consisted of two main components.

8.1 Teacher Professional Development (TPD)

In order to build teachers' capacities to implement the technology enabled programme, teachers were trained and oriented on the CLIx modules.

All the teachers from 30 schools were trained on digital literacy between September-October 2016. Subject teachers for Math and English were trained on the use of subject specific modules.

These training programmes were organised in close collaboration with the Chhattisgarh SCERT and TISS. The details of the coverage are given below in Table 29.

Table 29 : Summary of teacher trainings in 2016-17

Sr. No.	Training on Module	No.of Batches	No.of Days Per Batch	Training For	Target	Achievement
1	I2C	4	4 Day	Digital literacy	102(Teachers)+21 (Teacher educators)	95(Teachers) +14 (Teacher educators) in 4 Batches
2	CLIx Math	1	3 Day	Teaching Learning through Technology	33(Teachers)+07 (Teacher educators)	27(Teachers)+05 (Teacher educators)
3	CLIx English	1	2 Day	Teaching Learning through Technology	31(Teachers)+07 (Teacher educators)	25(Teachers)+05 (Teacher educators)

Teachers have also enrolled in online teacher communities hosted on Telegram. The online communities provide a space for the teachers to share and interact with each other as peers and also interact with subject experts and content specialists from TISS and MIT who are also members of these online communities of practice. Teachers use these communities to discuss their questions about their subject matter, the technological challenges encountered in their respective schools as well as their pedagogical experiences of using CLIx modules in the classes. Some of the teachers have been involved in the discussions on development of new modules with some of them (teachers from GHSS Rudri, GHSS Shankardah, GHSS Doma, GHSS Dhamtari and Seonikala schools) participating in design and development workshops with the subject teams in Mumbai.

8.2 Student Module Rollout

In order to make the schools ready for CLIx, the required software was installed in 30 schools. A tentative time-table for CLIx was worked out in 28 out of the 30 schools. Students module roll-out was started in the academic year 2016-17 with 24 schools rolling out the CLIx Math module and 26 schools rolling out the English modules. School computer lab checks are being done in a continuous manner. One of the major challenges has been accommodating large numbers of students within the available space of the computer lab. Typically, the computer labs are able to accommodate an average of 20 students so that two students can share one computer terminal. In schools with a large number of students in Grade 9, the idea of 'split class' is being tested wherein the class is split into three or four sub groups with sub groups spreading across and using the computer Lab, Science Lab, Library and Sports ground. This allows for maximal utilisation of available educational resources and allows the teachers to manage large classes in three different activities simultaneously. Our experience in schools where this has been tried is that the students are enjoying these split classes as they are exposed to different kinds of learning experiences.

9. CLIx Offerings for Year 2017-18

For teachers, CLIx is offering a Post Graduate Certificate Course on Reflective Teaching with ICT. This is a certification model for in-service teacher professional development. The CLIx programme will leverage ICT to provide sustained and long-term Professional Development to teachers by:

- Developing professional learning communities to reach rural schools and its teachers.
- Imbibing the transformative pedagogies with contextual, authentic content for teachers to re-engage with subject matter. (For further details refer to Annexure II).

For students, CLIx comprises of an introductory course on digital literacy, modules in Communicative English, Mathematics and Science for grade 8 and 9 students. In year 2, the existing modules shall be revised and offered based on feedback from teachers and our observations in schools. (For further details refer to Annexure I).

10. Challenges in 2016-17

There has been an overall appreciation for the initiative among the principals, teachersand students. However, there have been several challenges along the way in implementing the CLIx intervention.

ICT infrastructure in schools:

- Most of the schools have a large number of student and the ICT labs have only 11 computers. Average size of class IX in Dhamtari is 50 and in such conditions the teachers are finding it difficult to complete the CLIx modules. Apart from issues of accommodating students in the computer lab, teachers are also facing challenges in classroom management.
- Most of the hardware cannot accommodate the basic needs of modules such as audio input for each terminal.
- Day to Day maintenance of lab from is also an issue. Time taken by the service provider to resolve an issue is quite long and this disrupts the planned classes, which cannot be resumed until the technical issues are fixed.
- Internet connectivity and speed is very limited with the 3G dongle devices.

Teacher Educators and Teachers:

- Pressure on teachers to complete grade 9 syllabus before pre-board exams of grade 10th and 12th.
- Unavailability of teacher educators, who were selected and trained on the CLIx modules.
- Teachers' anxiety towards use of technology for teaching and learning.
- Teachers' perception of ICT as an additional subject but not a teaching-learning tool.
- Teachers insistence that the model will only work if there is a full time lab in-charge to help them facilitate the use of the modules.
- Teachers claim that they have too many additional responsibilities and cannot focus on CLIx.

Lack of timely support:

- Non reporting of technical issues by teachers to the concerned department/agency in a timely manner.
- Lack of on-time technical support from the service provider.
- Lack of resources at schools for the head masters to upgrade and maintain the computer labs.

11. Recommendations

The experience of implementing CLIx in Chhattisgarh highlighted many issues that need to be addressed in order to effectively implement any ICT programme in the state, including CLIx intervention. Some of these issues are: strengthening of the overall ICT infrastructure in schools, streamlining policies regarding teacher trainings and use of ICT resources for their professional development, use of open and free software, and adequate allocation and use of budgets and head teachers orientation to facilitate teachers for technology enable learning.

In this regard, some key recommendations for ICT in Chhattisgarh are:

1. Enhancing access and quality of computer based learning experiences for students (curriculum integration of ICT in Maths, Science, English)

The state government should enhance existing ICT infrastructure in schools. Specifically, it should:

i. Provide adequate number of computers to schools based on student enrollment to improve the computer-student ratio at to 1:2 or 1:3 (at present it is 1:5 or even worse).

ii. Replace five and more years old non-functional machines with new machines of the latest configuration.

iii. Ensure the computer lab is of an appropriate size to comfortably accommodate at least 2-3 students per machine.

iv. Ensure internet connectivity for computing lab with 4Mbps connection with unlimited upload/download for connected learning experience, access to open educational resources and information, easy syncing and retrieval of data.

v. Peripherals including headphones with microphones and splitters for listening and speaking.

vi. Power backup to the computer lab to avoid any data loss, to provide uninterrupted learning experience and ensure safety of machines.

vii. Provide on-going maintenance of computer lab and upgrade existing machines and repair/replace old ones.

viii. ICT@Schools new phase to move in the direction of wireless solutions including wireless keyboards, laptops/tablets (as opposed to desktops), and availability of peripherals such as headphones with microphones, USB microscopes etc.

ix. Zero-clients have limited capability with respect to audio-video, production, connectivity. Flexibility of device choice is essential (eg purchase of laptops/notebooks instead of desktops) so that the computer lab is made more accessible to larger batches.

2. Teacher Professional Development for and with ICT

i. To promote higher quality of in-service teacher professional development—recognize the value of certified courses to address lagging of in-service.

ii. Move towards cafeteria approach to in-service teachers training with a menu of courses that could be recognised and recommended to teachers.

iii. Allocate resources for TPD to enable teachers to become ICT users. For teachers' digital literacy and on use of NROER and other such open, interactive resources.

iv. Forming a formal cadre of subject Teacher Educators who can lead blended inservice education for teachers and support secondary education.

v. Support teachers for the purchase of personal computing devices.

vi. Data plans for teachers who are enrolled for courses or reimbursement of course fee with a contingency for computing device and data plan on successful completion with a minimum grade.

vii. Head teachers training and group formation through CoP for technology enabled learning.

3. Schools

i. Allocation in the school timetable for science labs and ICT labs for experiments, hands-on learning and technology enabled learning (approximately 30% of school time to be earmarked for lab, sports and library time).

ii. Flexibility in timetabling including batching and block period for use of science and ICT labs.

iii. Curricular resources to teachers and students in the form of supplementary hand-books, workbooks etc.

iv. Maintenance and refurbishment of science labs. Process of replenishment for consumables items.

v. Maintenance and refurbishment of libraries.

vi. School leadership training to manage and facilitate innovation and change.

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ANNEXURE

Annexure 1: Details of CLIx offering 2017-18

(1) Digital Literacy course

Digital Literacy provides learners with operational skills for the new media. In i2C, we invite learners to an exemplary connected learning experience on a specially designed course platform. i2C prepares learners for conceptual and investigative engagements in Science, Mathematics and Communicative English to be offered through CLIx. The skills thus acquired will last a lifetime.

Modules to be offered:

1. Introduction / Indic Typing
2. Drawing and Designing – Inkscape
3. Measuring and Observing – Spreadsheet
4. Dynamic Mathematics – Geogebra
5. Programming activities – Turtle
6. Simulations – Turtle
7. Mapping your world – Open Street Mapping

(2) English

The English course aims to improve learners' communicative abilities, especially oral communication skills, through an immersive experience using computer technology, by adopting a task-based, communicative language teaching approach for L2 or second language learners.

Modules to be offered:

i. English Elementary (30 lessons)

ii.English Beginners (10 lessons)

iii.English Pre-Beginner (20 lessons)

(3) Mathematics

CLIx Math aims to change the approach to math learning and teaching at high school level. It focuses on three core aspects to bring about desired changes, with technology as an enabler:

i. Re-interpreting the Curriculum: Strengthening the intended curriculum by building modules that use parts of the textbook content as the basis for building foundational concepts, streng-thening reasoning ability, and understanding core ideas of mathematics

ii. Transforming the Pedagogy: Learning through meaningful explorations and games, discussion of mathematical ideas

iii. Continuous professional development of Math teachers.

Modules to be offered:

1. Geometric reasoning
2. Proportional reasoning
3. Linear Equations

(4) Science: CLIx science focuses on strengthening the fundamentals of scientific learning.

Modules to be offered:

i. Physics:
   a. Fundamental idea of motion
   b. Force and Motion

ii. Astronomy

iii. Life Science:
   a. Ecosystem
   b. Health and Disease

iv. Chemistry
   a. Atomic Structure

(5) Values

A course on values will be offered to both students and teachers wherein students will work with rich stories and games that expose them to a wide variety of personal and social situations and help them to reflect on how they can make decisions in such situations. Teachers will be also be oriented and trained to reflect on their own values, which will allow them to be more effective role models for children. Teachers will also be equipped to facilitate values learning sessions with children in a way such that the students' ability to independently question and reflect on value dilemmas is strengthened.

Module/Course Offering for year 2017-18 (Students)

Subject	Module Name	Grade (s)	No. of periods required to complete the module (35 min or 45min)	When(Student to start using the modules)
Digital Literacy	Digital Literacy	9	20	April
English	English Beginner and/ or Elementary	9	20	June 2017 - Feb 2018
Maths	Geometric Reasoning	9	16	October
	Proportional Reasoning	9	13	January 2018
	Linear Equations	9	20	July, September
Science	Ecosystems	9	10	January
	Health and Disease	9	10	January
	Motion	9	10	June
	Sound	9	12	October
	Atomic structure	9	16	October

Annexure II: Details of Teacher Professional Development

(1) Post Graduate Certificate in Reflective Teaching with ICT

CLIx blended learning courses are offered as part of a Certificate programme for teachers. This programme is open to all teachers including those in schools that are implementing the CLIx project. The programme allows in-service teachers to engage in learning, extending over a school academic year in the following key areas:

1. Foundation courses focusing on 21st century learning skills including ICT
2. Blended courses in pedagogy of Mathematics, Science and English Language
3. Developing communities of practice for teachers
4. Establishing a pedagogical framework

Course will be offered in two phases:

1. 2017-18 TPD: (8 credit), it includes two courses:

i. Foundation Course - ICT in Education (4 credits)
ii. One Subject Specialization Course - English/Mathematics/Science (4 credits)

2. 2018-19 TPD: (9 credit), it includes following courses:

i. Action Research or Digital Portfolio (3 credits)

Electives:

i. Nurturing Values Development in Adolescents (2 credits)

ii. Using Media in Classrooms (2 credits)

iii. Hands-on Learning through Toy Making (2 credits)

Completion of 17 credits will lead to the award of the Post-Graduate Certificate (PGC) in Reflective Teaching with ICT.

(2) Teacher/Faculty Fellowships

CLIx Teacher/Faculty Fellowships for faculty from colleges, University Departments and teachers from schools involved with teaching Mathematics, Science, English, Technology and teacher education in the state of Chhattosgarh. The Fellows will be placed at TISS Mumbai to work with the CLIx curriculum development teams to contribute to the design and development of modules. The fellowship will provide an opportunity to work on new and emerging ideas in technology integration into curriculum and teacher professional development.

(3) Develop Local Leadership and Expertise

For long term sustainability, TISS and partner institutes will share their expertise and build the capacities of the local groups to develop local leadership in the development of technology integrated curriculum and teacher professional development.

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