CONNECTED LEARNING INITIATIVE

CLIx Intervention in Academic Year 2016-17

A Midline Review

Preliminary Consolidated report for
Chhattisgarh – Mizoram – Rajasthan

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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.

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1. Introduction

CLIx intervention was launched in schools during academic year 2016-17 for Grade 9 students in Chhattisgarh, Mizoram, Rajasthan and Telangana. This midline study is meant to be a dipstick into the gains achieved during the first year of intervention. The intervention started a few months after the schools had started (between August to October 2016). It was not uniform in terms of the extent of roll-out across the states and also within each of the states. Since the students covered in the academic year 2016-17 had moved to Grade 10 and were not participating in CLIx at the time of data collection (April-May 2017), it is an endline for this student cohort. However, for the teachers, it should be considered as the first midline review and may be used as a useful data point for analysis when the second midline study is conducted at the end of academic year 2017-18.

1.1. Specific Objectives

- To study the impact of CLIx intervention on student digital literacy and learning of Math, Science and English
- To study the impact of CLIx intervention on digital literacy among teachers and their beliefs about the same

1.2. Sample

A sub-sample of 19 schools has been purposively selected from the schools that were sampled for baseline. This subset of sample which we call our 'midline sample' has been selected on the basis of the extent of CLIx roll out in schools as reported by the field teams. The midline study does not include Telangana as the intervention in academic year 2016-17 was very thin. In Rajasthan, new teachers were appointed in 2 schools (1036 and 2032) and hence their response were not analysed for this report. To be able to analyse the change in attitudes and use of technology by teachers, if any, this report uses only cohort data of teachers. The details of the sample drawn is given below:

Table 1: Sample of schools used in the midline

State	No. of Sampled Schools	School CLIx Code
Chhattisgarh	5	1004, 1005, 1011, 1016, 1017
Mizoram	6	1009, 1010, 1017, 1022, 1025, 1027
Rajasthan	9	1001, 1027, 1029, 1036, 2012, 2019, 2022, 2024, 2032

Table 2: Extent of CLIx rollout in academic year 2016-17

State	I2C Rollout	Subject Module Rollout
Chhattisgarh	About 50% of I2C modules rollout was done.	Only Unit 1 to Unit 2 in English and Unit 1 in Maths were started in most of the schools
Mizoram	About 90% I2C modules were completed	English and Maths were started in few schools
Rajasthan	Less than 50% of I2C rollout was done. (Activity 1.1 to Activity 3.2)	Rollout was limited to English Lesson 1 in most of the schools

1.3. Data

This report uses data collected from the sample schools using [a] student tool - containing both general and learning assessment items and [b] teacher tool - containing general and domain specific items. The items considered in each of the tools for midline survey were a subset of those used in the baseline instrument. Midline tool was prepared based on 3 considerations: the extent of module offerings in schools during the first year of intervention, analysis done of the baseline data and inputs from the domain teams.

The teacher tool was administered using Open Data Kit (ODK) and the student tool was administered using paper and pencil. Data collection was done during April and May 2017. The survey was administered to all the Grade 9 students present on that day in sampled schools. Students who were not part of the baseline data collection were marked separately. The data for this latter set of students has not been analysed in this report since it is planned to be used for a separate analysis. In this report, we have analysed data for the student and teacher cohorts and have compared the data with the corresponding data from the baseline. This report is based on analysis of cohort data of 22 teachers and 227 students surveyed from 3 states. The cohort for which both baseline and midline data is considered comprises of 8 teachers and 55 students from Chattisgarh; 7 teachers and 95 students from Mizoram; 7 teachers and 77 students from Rajasthan.

For analysis of students data the Wilcoxon matched-pair signed rank test is used to compare scores in the baseline and midline since the results are for same cohort. If the P-value is less than 0.05 we reject null hypothesis that difference between the pairs follows a symmetric distribution around zero, the average score is calculated to compare the groups. For categorical data the Chi-square test is used. The main findings of the midline review are presented in the next section. The detailed tables and explanations on the analyses is available in the annexures for reference.

2. Main Findings

The main findings of the midline review are discussed in the following sections. We first present the findings related to the students and then discuss those related to the teachers.

2.1 Main findings from students' data:

Student performance in terms of their domain knowledge in English, change in their level of technical skills, beliefs and values have been analysed in this section.

2.1.1 Difference in Learning Assessment Scores in English:

Comparing average scores of students from midline survey with their respective scores in the baseline in English assessment test, the results show that there is statistically significant difference between score of same cohort in the baseline and midline.

Better Offs: In Mizoram and Rajasthan, students have scored more during midline in English assessment test.

Worse Offs: In Chhattisgarh students have scored less during midline compared to baseline performance in English assessment test.

Table 3: Learning assessment scores in English

State	Mean score in the baseline	Mean score in the midline	P-value
Chhattisgarh	33.73	27.47	0.0019*
Mizoram	35.78	44.21	0.0003*
Rajasthan	26.11	30.44	0.0337*

2.1.2. Difference in percentage of students who know to use a computer:

We studied the difference in the computer and digital skills acquired by students after the first year of the roll out.

Better Offs: Student self-reporting about knowing how to use the computers changed from baseline to midline. The overall percentage of students indicating that they know how to use a computer went up from the baseline to the midline in all the three states.

Table 4: Percentage of students who know how to use a computer

State	Percentage of students knowing how to use a computer (baseline)	Percentage of students knowing how to use a computer (midline)	P-value
Chhattisgarh	71.15%	78.85%	0.001*
Mizoram	60.00%	78.89%	0.000*
Rajasthan	42.67%	56.00%	0.1673

2.1.3. Difference in Computer literacy:

Comparing average scores of students from midline survey with their respective scores in the baseline in computer literacy[1], the results show that there is statistically significant difference between score of same cohort in the baseline and midline for Chhattisgarh and Mizoram. For Rajasthan the test shows there is no significant difference.

Better Offs: In Mizoram and Rajasthan, the average score in computer literacy has slightly increased in the midline.

Worse Offs: In Chhattisgarh, the average score in computer literacy has decreased in the midline.

2.1.4. Difference in Digital Skills:

Comparing average scores of students from midline survey with their respective scores in the baseline in digital skills[2], the results show that there is statistically significant difference between score of same cohort in the baseline and midline only for state Chhattisgarh. For the states Mizoram and Rajasthan the test shows there is no significant difference.

[1] Computer literacy score is calculated based on 8 basic skills of using computer. This includes items like "starting a computer", "handling a mouse" etc. Responses were reverse coded such that higher the score, greater is the frequency of engaging with computer. Reverse coded response were added across items to generate overall score for computer literacy. (Refer to Annexure 1 for detailed classification and tables)

[2] Digital Skill score is calculated based on 14 skills on applications using computer. This includes items like "Use email", "Download/upload files" etc. Here too, responses were reverse coded such that higher the score, greater is the frequency of engaging with Digital items. Reverse coded response were added across items to generate overall score for Digital Skill score. (Refer to Annexure 1 for detailed classification and tables)

Better Offs: In Mizoram and Rajasthan, the average score in digital literacy is almost same in the baseline and midline.
Worse Offs: In Chhattisgarh the average score in digital literacy has decreased in the midline.

2.1.5. Concerns about Use of Technology:

Comparing average scores of students from midline survey with their respective scores in the baseline for statements which measured levels of agreement over concerns of using the technology3, the results show that there is statistically significant difference between score of same cohort in the baseline and midline for Chhattisgarh and Mizoram. For Rajasthan the test shows there is no significant difference.
Better Offs: In Chhattisgarh and Mizoram, the average score has decreased in the midline which implies that there is an increase in confidence among students to use technology.
Worse Offs: In Rajasthan, the average score has slightly increased in the midline.

Most common fear - When we compared percentage of students agreeing with
all the 4 items there was decrease in percentage of students agreeing from baseline to midline in Chhatisgarh and Mizoram. However, in Rajasthan increase in agreement for all the 4 items was observed.

Table 5: Changes in concerns expressed about use of technology

	Chhattisgarh	**Mizoram**	**Rajasthan**
Items that recorded highest level of decrease in agreement from baseline to midline	Surfing on internet is a waste of time	If given an opportunity to use a computer, I am afraid I may break or damage it	
Items that recorded highest level of increase in agreement from baseline to midline			If given an opportunity to use a computer, I am afraid I may break or damage it

[3] Score on concerns about use of technology is calculated based on 4 statements. Responses were reverse coded such that higher the score greater is the agreement with the fear of engaging with technology.. Reverse coded response were added across items to generate overall score for concerns of students. (Refer to Annexure 2 for detailed classification and tables)

2.1.6. Perceptions about General Values (stated negatively):

Overall Score for General Values is calculated based on 5 statements[4]. Responses were reverse coded such that higher the score greater is the agreement with the belief about general values. Reverse coded response were added across items to generate overall score for General Values.

Comparing average scores of students from midline survey with their respective scores in the baseline for statements on values which were stated negatively, the results show that there is statistically significant difference between score of same cohort in the baseline and midline only for Mizoram. For Chhattisgarh and Rajasthan, the test shows there is no significant difference.

Better Offs: In Mizoram and Chhattisgarh the average score has decreased in the midline. The agreement with the negative statement has decreased.

Worse Offs: In Rajasthan the average score has increased in the midline.

2.1.7. Perceptions about individual's work "ethics" (stated positively):

Comparing average scores of students from midline survey with their respective scores in the baseline for statements on values which were stated positively[5], the results show that there is statistically significant difference between score of same cohort in the baseline and midline only in Mizoram.

Better Offs: There is increase in the average score in the midline implying the agreements have increased in all 3 states, though in case of Chhattisgarh and Rajasthan the increase was not significant.

2.2. Main findings from teachers' data

A total of 22 teachers from English and Maths domain, were surveyed in the midline. All these teachers were surveyed in the baseline too. We present here findings with respect to their access, usage of technology, their beliefs and perceptions about use of technology and their professional interaction among themselves. Since the numbers of teachers is small, averages and percentages have not been used. Detailed school wise tables on teacher-related variables are given in the Annexure 4 to 9 for each of the states. The key findings are summarised below:

[4] Refer to Annexure 3 for detailed classification and tables

[5] Overall score for perception about individual's work "ethics" is calculated based on 6 statements. Responses were reverse coded such that higher the score, greater is the agreement with the belief about individual's work "ethics". Reverse coded response were added across items to generate overall score for perception about individual's work "ethics". (Refer to Annexure 3 for detailed classification and tables)

2.2.1. Access to technology:

All the teachers except one teacher in Rajasthan have mobile phones. Half of the teachers in Chhattisgarh, almost all the teachers in Rajasthan and all the teachers in Mizoram had data plan on their mobile phone. Around half of the teachers surveyed also had access to a computer/laptop.

2.2.2. Use of technology:

Average scores of teachers from midline survey were compared with their respective scores in the baseline on use of technology[6].

Better Offs: On an average, teachers from Mizoram and Rajasthan have increased their use of ICT in classrooms. The average score on ICT engagement increased from baseline to midline by 1.4 units in case of Mizoram teacher cohort and by 1.2 units in the case of Rajasthan teacher cohort.

Worse Offs: On an average, teachers from Chhattisgarh have marginally fallen back in their use of ICT with a difference of 0.25 between baseline and midline.

Improvement by teacher-wise data: Majority of the teachers surveyed reported improvement in their use of ICT in classroom practices in Mizoram (86 percent) and Rajasthan (57 percent).

2.2.3. Computer and digital skills:

Computer literacy[7] and digital skill[8] score together comprise the Technical Skill Score of a teacher. We compared the technical skill score (composite of computer literacy scores and the digital skills score) of the teachers from baseline data and the midline data and recorded the changes noticed.

[6] Responses on use of technology were reverse coded such that higher the number, greater is the frequency of engagement with Technology. Reverse coded responses were added across 9 items to generate an overall score which was then converted into percentage. (Refer to Annexure 4 for detailed classification and tables)

[7] Computer literacy score is calculated based on 9 basic skills of teachers to operate a computer. This includes items like "starting a computer", "handling a mouse" etc. Responses were reverse coded such that higher the score, greater is the frequency of engaging with computer. Reverse coded response were added across items to generate overall score for computer literacy. (Refer to Annexure 5 for detailed classification and tables)

[8] Digital skills included 13 relatively more advanced skills of operating digital technology. It included items like "using hyperlinks", "programming a task", "using simulation" etc. Responses were reverse coded such that higher the score greater is the frequency of engaging with digital items. Reverse coded response were added across items to generate overall score for digital skill score. (Refer to Annexure 5 for detailed classification and tables).

Better Offs: The average scores for all 3 states have showed improvement in terms of Computer Literacy Score and Digital Skill Score.
Computer Literacy. Greatest improvement in the average score for Computer Literacy was noticed for Chhattisgarh (8.25 points) and the least was noted for Rajasthan (0.57 points).
Digital Skill. Greatest improvement in the average score for Digital Skills was noticed for Rajasthan (13.8 points) and the least was noted for Mizoram (4.6 points).
Improvement by teacher-wise data: Majority of the teachers surveyed reported improvement on the overall Technical skills in Mizoram (100 percent), Rajasthan (83 percent) and Chhattisgarh (88 percent).

2.2.4. Beliefs about use of technology in education:

Teachers were asked questions that probed their beliefs[9] about use of technology. The beliefs were categorised into positive beliefs (6 questions) that could facilitate their adoption and use of technology in classrooms and negative beliefs (4 questions) that might hinder their adoption and use of technology in classrooms.
Better Offs: As compared to baseline, during midline survey, on an average teachers from Mizoram reported to agree more with positive beliefs and disagree more with negative beliefs. In Rajasthan, agreement with negative beliefs increased by 0.14 units during midline and the agreement with positive beliefs has increased even more (change of 1.14 units).
Worse Offs: On an average, teachers from Chhattisgarh are reported to agree more with negative beliefs and disagree more with positive beliefs, as compared to baseline.
Improvement by teacher-wise data: Despite variation across states, by and large teacher-wise data shows improvement in teachers' belief in technology.

In Chhattisgarh, 50 percent teachers had shifted towards more positive beliefs about use of technology in classrooms.
In Mizoram, 43 percent of the teachers have shifted towards more positive beliefs about use of technology in education vis-a-vis their baseline scores. 14 percent of the teacher have expressed more negative beliefs about use of technology in the midline.
In Rajasthan, 57 percent of the teachers showed a shift towards positive beliefs about use of technology and 28 percent of the teachers showed more negative beliefs than what was seen in the baseline.

[9] An overall score given to positive beliefs and negative beliefs was used to compare the change between the baseline and midline data. Positive beliefs were reverse coded such that higher the number, greater is the agreement. 4 questions on negative beliefs were coded such that higher the number greater is the disagreement with the belief. These codes were summed up across respective questions to generate overall score on the beliefs. (See Annexure 6 for detailed classification of items under positive and negative beliefs and detailed comparative tables).

2.2.5. Teacher Preparedness:

Domain teachers self-reported their level of preparedness[10] on various topics covered in their domain. We then compared the percentage scores across the states for baseline and midline data collected, we found that:

Better Offs: Average level of preparedness among teachers in Mizoram and Chhattisgarh has increased by 31 and 11 percent respectively.

Worse Offs: Average level of preparedness among teachers in Rajasthan has gone down by 11 percent.

Improvement by teacher-wise data: Majority of the teachers reported improvement in their level of domain preparedness in Mizoram (100 percent) and Chhattisgarh (75 percent).

2.2.6. Professional Interaction:

Domain teachers self-reported their level of professional interaction[11] on various items covered in their domain. We then compared the percentage scores across the states for baseline and midline data collected. We found that:

Better Offs: There has been an improvement in the level of professional interaction of teachers in all 3 states. The change in level of interaction was highest for Chhattisgarh (6.8 percent) followed by Mizoram (3.9 percent) and Rajasthan (0.8 percent).

Improvement by teacher-wise data: Majority of the teachers from Chhattisgarh (50 percent) showed improvement in their level of interaction. Among the remaining, majority did not show change when compared to the baseline. For Mizoram, 29 percent of the teachers surveyed showed improvement in frequency of professional interaction, majority of the remaining teachers did not show change when compared to the baseline.

2.2.7. Challenges and Concerns:

Teachers reported on how challenging they found their existing situation while trying to integrate technology to education. An overall percentage score for challenges and concerns[12] was generated to compare across the states for baseline and midline data. We found that:

Better Offs: During midline, average score is 4.14 and 1.4 percent lesser than that of baseline for Mizoram and Rajasthan respectively. This implies that teachers' overall agreement with the challenges and concerns towards integrating technology into education has gone down

[10] Responses were coded such that higher the number, higher is their level of preparedness. Responses were summed up across items of interest to generate an overall score which was then converted into a percentage for comparison across domains. For detailed tables on the changes, refer to Annexure 7.

[11] Responses were coded such that higher the number, higher is the frequency of peer interaction. Coded responses were summed up to generate an overall score for interaction which was then converted into a percentage for comparison across domains. For detailed tables on the changes, refer to Annexure 8.

[12] Responses were coded such that higher the number greater is the challenge perceived by respondent. Coded responses were summed up to generate an overall score for challenge which was then converted into a percentage for comparison across domain. For detailed tables on the changes, refer to Annexure 9.

over the year. Teachers from Mizoram and Rajasthan find their current situation more conducive for integrating technology to education.

Worse Offs: Level of challenges and concerns expressed to integrate technology in education has increased for Chhattisgarh. During midline, average score is 4.12 percent higher than that of baseline for Chhattisgarh.

Improvement by teacher-wise data: Majority of the teachers from Mizoram (71.4 percent) and Rajasthan (57 percent) tend to find their situation less challenging with regard to technological integration.

3. Conclusions

The above mentioned findings are based on limited data for the student and teacher cohorts that were studied and compared across baseline and midline. The findings indicate that there has been some change in student learning assessment in English. There has been increase in percentage of students who know to use computers for all 3 states. The decrease in concerns about use of technology is seen in Chhattisgarh and Mizoram. There has been an improvement in computer literacy in Mizoram. The beliefs, perceptions and values has changed in some areas for the better but remains the same or has regressed in some. This is understandable as the changes in these areas is more difficult to achieve, particularly given the limited level of rollout that had happened during the period under consideration. Given that we have little data about the input into these schools during this period and since the midline did not include control schools, it is hard to attribute the impact to CLIx intervention.

With regard to the teachers, there has generally been an improvement in the teachers' use of technology and their own computer and digital skills. Their beliefs and perceptions about use of technology have changed, overall for the better but this again is a long drawn process. We also find that teachers' self reporting of their preparedness to teach their subject has also improved. While this report presents the differences observed in datasets from baseline and midline, the sample selected has been small and hence the findings may not be considered generalisable. However, they can be seen to be indicative of the changes that have happened in terms of the constructs considered among students and teachers during the period when CLIx was rolled out in the schools for the first time.

Annexure 1 - Computer and Digital Skills for Students

Annexure 1.a. List of Items on Computer Literacy and Digital Skills for Students

Items under Computer Skills	Items under Digital Skills
1. Start a computer 2 Type in English on computer 3 Handle Mouse 4 Save files 5 Use word/notepad files 6 Use a spreadsheet 7. Use a paint-brush 8. Type in Hindi/Mizo/Telugu	1. Use Internet browser (eg. Google Chrome /Internet Explorer) 2 Use e-mail 3 Play computer games 4 Use hyperlinks (links from one site to another site) 5 Download/upload files (including on whatsapp) 6 Record audio/video on phone/camera 7 Click pictures with digital camera 8 Program a task 9. Use simulation 10 Use online maps 11 Book ticket online 12 Download & use apps on the mobile phone 13 Use video conferencing tool like skype 14 Fill online form

Annexure 1.b. State-wise findings on Technical skills:

State	Computer Literacy				Digital Skills			
	Mean score in baseline	Mean score in midline	P-value	Change	Mean score in baseline	Mean score in midline	P-value	Change
Chhattisgarh	30.17	28.48	0.0493*	(-)	45.61	41.52	0.0201*	(-)
Mizoram	27.08	27.98	0.0112*	(+)	39.7	39.87	0.3574	(+)
Rajasthan	26.27	27.7	0.2428	(+)	44.06	44.41	0.9248	(+)

Annexure 1.c. Item-wise Analysis:

The responses for computer literacy and digital literacy are based on 5-scale response. Based on percentage difference seen in the baseline and midline for first and last option the item which saw comparatively more difference in response are given below.

Items in Computer literacy

	Chhattisgarh	**Mizoram**	**Rajasthan**
Items that recorded comparatively more increase in %of responses for option "Have done it extremely well on my own, without any help"	Start a computer Handle a mouse Use paint	Start a computer Use paint Type in English	Start a computer Handle a mouse

Items in Digital literacy

	Chhattisgarh	**Mizoram**	**Rajasthan**
Items that recorded comparatively more increase in %of responses for option "Have done it extremely well on my own, without any help"	Play computer Games Download & use apps on the mobile phone	Use chat online Download & use apps on the mobile phone	Record audio/video Play computer Games

Annexure 2 Concerns about use of Technology among Students

Annexure 2.a. Items under concerns about use of technology

If given an opportunity to use a computer, I am afraid I may break or damage it
I hesitate to use computer because I may make a mistake
I don't think computers can help me with my studies
Surfing on internet is a waste of time

Annexure 2.b. State-wise findings on Concerns about Use of Technology

State	Mean score in the baseline	Mean score in the midline	P-value	Direction of Change
Chhattisgarh	10.96	9.88	0.0126*	(-)
Mizoram	10.02	9.41	0.0321*	(-)
Rajasthan	10.82	11.34	0.5685	(+)

Annexure 3 Values among students

Annexure 3.a. Items under Values

Perceptions about general values (stated negatively)	Perceptions about individual's work "ethics" (stated positively)
1. Only students getting high percentage should pursue studies after Grade 10 2. Children of illiterate parents are not good at studies 3. Boys are better than girls in using computers 4. Not knowing how to speak English is embarrassing 5. Only male teachers should teach Math and Science	1. I can deal with any kind of challenges in my school 2. I like to experiment with new ways of doing projects/assignments 3. I complete whatever work I start on 4. I like to work in a team than working alone 5. Even if the subject is not interesting, I keep working until I finish 6. I persist even with the most boring task

Annexure 3.b. State-wise findings on Values

State	Perceptions about General Values				Perceptions about individual's work "ethics"			
	Mean score in the baseline	Mean score in the midline	P-value	Direction of change	Mean score in the baseline	Mean score in the midline	P-value	Direction of change
Chhattisgarh	12.16	11.66	0.3084	(-)	17.63	18.38	0.3404	(+)
Mizoram	10.87	9.25	0.0000*	(-)	17.65	17.98	0.0370*	(+)
Rajasthan	11.94	12.6	0.8432	(+)	16.86	17.89	0.2668	(+)

Annexure 3.c. Item-wise Analysis: Perceptions about General Values

	Chhattisgarh	Mizoram	Rajasthan
Items that recorded highest level of decrease in agreement from baseline to midline	Boys are better than girls in using computers	Not knowing how to speak English is embarrassing	Boys are better than girls in using computers
Items that recorded highest level of increase in agreement from baseline to midline	Children of illiterate parents are not good at studies		

Item-wise Analysis: Perceptions about individual's work "ethics"

	Chhattisgarh	Mizoram	Rajasthan
Items that recorded highest level of decrease in agreement from baseline to midline		I like to work in a team than working alone	I persist even with the most boring task
Items that recorded highest level of increase in agreement from baseline to midline	I can deal with any kind of challenges in my school	I complete whatever work I start on	I can deal with any kind of challenges in my school

Annexure 4 Use of technology among teachers

Annexure 4.a. List of items on use of technology

1. Browsed/ searched the internet for personal use
2. Browsed/ searched the internet to collect teaching materials to prepare lessons
3. Use power point /slides for presenting in conference/district meeting/other
4. Created digital learning materials for students
5. Searched for courses/ activities for professional development
6. Interacted with online teachers' communities (including whatsapp groups)
7. Documented your class-work using video/audio
8. Attended EduSat classes
9. Used Smart-boards

Responses were summed up to generate overall score on ICT which were then converted into percentages based on the formula below-
ICT Score as a percentage= (Overall Score on ICT/36)*100

Annexure 4.b. State-wise findings on Use of technology

State	Average score		Unit change
	BL	ML	
CG	14	13.75	-0.25
MZ	12.29	13.71	1.43
RJ	13.57	14.86	1.29

Annexure 4.c. Teacher-wise findings on Use of technology

Chhattisgarh

School	**% Score on ICT usage (BL)**	**% Score on ICT usage (ML)**	**Change**	**Number of teachers**
1004	39%	25%	(-)	1
1005	28%	42%	(+)	2
	50%	42%	(-)	
1011	39%	39%	No change	2
	47%	42%	(-)	
1016	36%	31%	(-)	1
1017	28%	39%	(+)	2
	44%	47%	(+)	

Mizoram

School	% Score on ICT usage (BL)	% Score on ICT usage (ML)	Change	Number of teachers
1009	25%	27%	(+)	1
1010	25%	25%	No change	2
	28%	33%	(+)	
1017	36%	47%	(+)	1
1022	42%	47%	(+)	1
1025	47%	47.2%	(+)	1
1027	36%	39%	(+)	1

Rajasthan

School	% Score on ICT usage (BL)	% Score on ICT usage (ML)	Change	Number of teachers
1001	42%	31%	(-)	1
1027	44%	36%	(-)	1
1029	25%	36%	(+)	1
2012	25%	25%	No change	1
2019	33%	42%	(+)	1
2022	53%	69%	(+)	1
2024	42%	50%	(+)	1

Annexure 5 Computer and Digital Skills among Teachers

Annexure 5.a. Items under Computer and Digital Skills among teachers

Items under Computer Skills	**Items under Digital Skills**
1. Start a Computer 2 Type in English on computer 3 Handle Mouse 4 Save Files 5 Use Word/notepad files 6 Use a spreadsheet 7 Use power point 8. Use a paint-brush 9 Type in Hindi/Mizo/Telugu	1. Use Internet browser (eg. Google Chrome /Internet Explorer) 2 Use E-mail 3 Play Computer games 4 Use Hyperlinks (links from one site to another site) 5 Download/upload files (including on whatsapp) 6 Record audio/video on phone/camera 7 Click pictures with digital camera 8 Program a task 9. Use simulation 10 Use online maps 11 Book ticket online 12 Download & use apps on the mobile phone 13 Use video conferencing tool like skype

Annexure 5.b. State-wise findings on Technical Skills

State	**Average score on Computer Literacy**		**Unit change**	**Average score on Digital Skill**		**Unit change**
	BL	**ML**		BL	ML	
CG	23.88	32.13	8.25	29.38	34.75	5.38
MZ	29.14	33.14	4.00	37.57	42.14	4.57
RJ	34.57	35.14	0.57	27.57	41.43	13.86

Annexure 5.c. Teacher-wise data for all states

Chhattisgarh:

School	Baseline		Technical skill score (Baseline)	Midline		Technical skill score (Midline)	Change
	Computer Literacy	Digital Skills		Computer Literacy	Digital Skills		
1004	21	21	42	21	16	37	-5
1005	13	13	26	35	28	63	37
	41	43	84	45	50	95	11
1011	42	41	83	36	47	83	0
	43	53	96	43	62	105	9
1016	9	21	30	21	19	40	10
1017	9	14	23	21	15	36	13
	21	29	50	35	41	76	26

Mizoram

School	Baseline		Technical skill score (Baseline)	Midline		Technical skill score (Midline)	Change
	Computer Literacy	Digital Skills		Computer Literacy	Digital Skills		
1009	26	18	44	29	26	55	11
1010	26	38	64	31	40	71	7
	17	26	43	21	34	55	12
1017	32	46	78	37	47	84	6
1022	36	49	85	43	57	100	15
1025	45	61	106	45	65	110	4
1027	22	25	47	26	26	52	5

Rajasthan

School	Baseline		Technical skill score (Baseline)	Midline		Technical skill score (Midline)	Change
	Computer Literacy	Digital Skills		Computer Literacy	Digital Skills		
1027	38	21	59	27	27	54	-5
1029	20	21	41	36	54	90	49
2012	19	15	34	25	27	52	18
2019	42	29	71	40	51	91	20
2022	45	41	86	45	65	110	24
2024	39	25	64	43	43	86	22

Annexure 6 Beliefs about use of technology in education among teachers

Annexure 6.a. Items under Beliefs about Technology among teachers

Items under Positive Belief	**Items under Negative Belief**
1. Computers help students grasp difficult curricular concepts 2. Integrating technology in teaching will increase collaboration among students 3. Student learning during group work is worth the extra time that it takes 4. Students interact with each other more while working with computers 5. Using technology like Internet, digital cameras, computer applications can help students apply and practically relate to concepts they learn in textbook 6. Some of the computer applications allow doing the tasks again and again which reduces the fear of failure among students.	1. Computers make students lazy 2. Students working in groups is very time consuming 3. Students' writing quality is worse when they use computers to type. 4. Use of Technology is mostly for developing technical skills and it is not useful in applying or drawing out real life examples of concepts in textbook

Annexure 6.b. State-wise findings on Beliefs about Technology:

State	Average score on Positive Belief		Unit change	Average score on Negative Belief		Unit change
	BL	ML		BL	ML	
CG	19	18.5	-0.5	10.75	10	-0.75
MZ	18.00	18.57	0.57	9.57	9.86	0.29
RJ	17.71	18.86	1.14	9.14	9	-0.14

Annexure 6.c. Teacher-wise Tables:

Chhattisgarh

School	Teacher	Positive Belief (BL)	Positive Belief (ML)	Change (in terms of agreement)	Negative Belief (BL)	Negative Belief (ML)	Change (in terms of agreement)
1004	T1	20	21	(+)	8	8	-
1005	T2	17	18	(+)	9	13	(-)
	T3	21	20	(-)	11	8	(+)
1011	T4	23	18	(-)	11	10	(+)
	T5	17	18	(+)	12	9	(+)
1016	T6	18	18	-	12	10	(+)
1017	T7	15	17	(+)	12	11	(+)
	T8	21	18	(-)	11	11	No change

T1: Agreement with regard to positive belief as increased. There was no difference in terms of negative belief. Overall there has been a shift towards pro-technology beliefs.

T2: Agreement with positive beliefs have gone up. Agreement with negative beliefs have reduced. Overall there has been a shift towards pro-technology.

T3: While Agreement with positive beliefs have reduced, it has increased with negative beliefs. Overall there has been a shift away from pro-technology beliefs.

T4: While Agreement with positive beliefs have reduced, it has increased with negative beliefs. Overall there has been a shift away from pro-technology beliefs.

T5: Agreement with both negative and positive beliefs have gone up. But agreement with negative beliefs have gone up more than that with the positive beliefs. Hence we can say there has been a shift away from pro-technology beliefs.

T6:There was no difference in terms of positive belief. It has increased with negative beliefs. Overall there has been a shift away from pro-technology beliefs.

T7: Agreement with both negative and positive beliefs have gone up. But agreement with negative beliefs have gone up more than that with the positive beliefs. Hence we can say there has been a shift away from pro-technology beliefs

T8: While Agreement with positive beliefs have reduced, it has remained the same with negative beliefs. Overall there has been a shift away from pro-technology beliefs.

Mizoram:

School	**Teacher**	**Positive Belief (BL)**	**Positive Belief (ML)**	**Change (in terms of agreement)**	**Negative Belief (BL)**	**Negative Belief (ML)**	**Change (in terms of agreement)**
1009	T1	18	18	(-)	9	9	No change
1010	T2	18	18	-	9	9	No change
	T3	17	17	-	12	11	(+)
1017	T4	19	21	(+)	6	9	(-)
1022	T5	18	19	(+)	10	10	No change
1025	T6	18	19	(+)	11	11	No change
1027	T7	18	18	-	10	10	No change

T1: There is decline in agreement with positive belief. There is not any difference in agreement with negative beliefs. Overall there has been a shift away from the pro-technology belief.

T2: There is not any difference in agreement with positive and negative beliefs.

T3: There is not any difference in agreement with positive beliefs. Agreement with negative beliefs have increased. Overall there has been a shift away from the pro-technology belief.

T4: There is not any difference in agreement with positive beliefs. In terms of negative beliefs, teacher disagreement has increased in the midline. Overall there has been a shift towards pro-technology belief.

T5: There is increase in agreement with positive belief. There is no change in the level of agreement with negative beliefs. Overall there has been a shift towards pro-technology belief.

T6: There is increase in agreement with positive belief. There is no change in the level of agreement with negative beliefs. Overall there has been a shift towards pro-technology belief.

T7: There is not any difference in agreement with positive and negative beliefs.

Rajasthan:

School	Teacher	Positive Belief (BL)	Positive Belief (ML)	Change (in terms of agreement)	Negative Belief (BL)	Negative Belief (ML)	Change (in terms of agreement)
1001	T1	17	18	(+)	11	9	(+)
1027	T2	18	18	-	9	11	(-)
1029	T3	18	19	(+)	11	9	(+)
2012	T4	11	15	(+)	8	8	No change
2019	T5	19	23	(+)	9	9	No change
2022	T6	22	21	(-)	5	6	(-)
2024	T7	19	18	(-)	11	11	No change

T1: There is increase in agreement with positive and negative beliefs. However the increase is more for negative beliefs. Overall there has been a shift away from the pro-technology belief.

T2: There is not any difference in agreement with positive beliefs. In terms of negative beliefs, teacher disagreement has increased in the midline. Overall there has been a shift towards pro-technology belief.

T3: There is increase in agreement with positive and negative beliefs. However the increase is more for negative beliefs. Overall there has been a shift away from the pro-technology belief.

T4: There is increase in agreement with positive belief. There is no change in the level of agreement with negative beliefs. Overall there has been a shift towards pro-technology belief.

T5: There is increase in agreement with positive belief. There is no change in the level of agreement with negative beliefs. Overall there has been a shift towards pro-technology belief.

T6: There is decline in agreement with positive and negative beliefs of equal amount. Overall there has been not much change in the belief.

T7: There is decline in agreement with positive belief. There is not any difference in agreement with negative beliefs. Overall there has been a shift away from the pro-technology belief.

Annexure 7 Teacher Preparedness

Annexure 7.a. State-wise findings on Teacher Preparedness:

State	Average score on Domain Preparedness		Percentage change
	BL	ML	
CG	59.75	71.25	11.50
MZ	48.71	80.48	31.77
RJ	49.86	39.05	-10.81

Percentage Score on Domain Preparedness= (Domain Preparedness Score/Highest score possible for each domain[13])*100

[13] If teachers are "Very well Prepared" in all 6 content then the highest possible score is 24. Similarly, for Maths, if teachers are "Very well Prepared" in all 5 content then the highest possible score is 20.

Annexure 7.b. Teacher-wise tables:

Chhattisgarh

School	% Score on Domain Preparedness (BL)	% Score on Domain Preparedness (ML)	Change
1004	49%	73%	(+)
1005	70%	61%	(-)
	51%	60%	(+)
1011	35%	67%	(+)
	65%	72%	(+)
1016	65%	67%	(+)
1017	59%	87%	(+)
	85%	83%	(-)

Mizoram

School	% Score on Domain Preparedness (BL)	% Score on Domain Preparedness (ML)	Change
1009	25%	33%	(+)
1010	31%	72%	(+)
	57%	87%	(+)
1017	71%	94%	(+)
1022	57%	83%	(+)
1025	67%	93%	(+)
1027	33%	100%	(+)

Rajasthan

School	% Score on Domain Preparedness (BL)	% Score on Domain Preparedness (ML)	Change
1001	33%	47%	(+)
1027	75%	33%	(-)
1029	37%	40%	(+)
2012	69%	40%	(-)
2019	67%	47%	(-)
2022	33%	33%	No change
2024	35%	33%	(-)

Annexure 8 Professional Interaction among teachers

Annexure 8.a. Items under Professional Interaction among teachers

English Teacher	Maths Teacher
1. Discussions about how to teach a particular concept 2. Working on preparing lesson plans 3. Visits to another teacher's classroom to observe his/her teaching 4. Informal observations of my classroom by another teacher 5. Discussions with other subject teachers to integrate English with other disciplines	1. Discussions about how to teach a particular concept 2. Working on preparing lesson plans 3. Visits to another teacher's classroom to observe his/her teaching 4. Informal observations of my classroom by another teacher

Percentage score on Interaction = Overall score on interaction/Highest possible score[14])*100

[14] If all English teachers interact "Daily" on all the 5 items then the highest possible score is 20. Similarly for Maths, if all the teachers interact "Daily" on all the 4 items then the highest possible score is 16.

Annexure 8.b. State-wise findings on Professional Interaction:

State	Average score on Interaction as a Percentage		Percentage change
	BL	ML	
CG	59.69	66.56	6.88
MZ	37.86	41.79	3.93
RJ	64.29	65.18	0.89

Annexure 8.c. Teacher-wise tables:

Chhattisgarh

School	% Score on Interaction (BL)	% Score on Interaction (ML)	Change
1004	62.5	56.25	(-)
1005	45	70	(+)
	93.75	81.25	(-)
1011	70	85	(+)
	62.5	68.75	(+)
1016	25	68.75	(+)
1017	50	40	(-)
	68.75	62.5	(-)

Mizoram

School	% Score on Interaction (BL)	% Score on Interaction (ML)	Change
1009	37.5	31.25	(-)
1010	40	65	(+)
	37.5	31.25	(-)
1017	45	30	(-)
1022	30	60	(+)
1025	37.5	37.5	No change
1027	37.5	37.5	No change

Rajasthan

School	% Score Interaction (BL)	% Score on Interaction (ML)	Change
1001	100%	56%	(-)
1027	81.25%	75%	(-)
1029	69%	69%	No change
2012	50%	56%	(+)
2019	25%	56%	(+)
2022	75%	63%	(-)
2024	50%	81%	(+)

Annexure 9 Challenges and concerns about integration of technology indicated by teachers

Annexure 9.a. List of Items listed under Challenges

1. Not enough computers in the Computer Lab

2 Not enough training for teachers to use Computers
3 Not enough opportunity to practice Computers in curriculum
4 Unstable/ intermittent power supply.
5 Frequent crashing of computers or outdated computers
6 Internet is too slow
7 Too many students in the class (difficult to give individual attention to students)
8 Don't know how to use computers for subjects I teach
9 Leadership is not supportive
10 Students are at different levels
11 Computer teacher is not available
12 Use of technology will take time away from completion of syllabus
13 Use of technology will make it difficult to manage students in the class as they have difficulties with operation of a computer

Annexure 9.b. State-wise findings on Challenges for Technological Integration:

State	Average score on Challenge		Percentage change
	BL	ML	
CG	48.13	52.25	4.13
MZ	53.86	49.71	-4.14
RJ	55.86	54.43	-1.43

Annexure 9.c. Teacher-wise tables:

Chhattisgarh

School	% score on Challenge (BL)	% score on Challenge (ML)	Change
1004	61	60	(-)
1005	42	29	(-)
	42	54	(+)
1011	32	59	(+)
	60	48	(-)
1016	53	63	(+)
1017	56	60	(+)
	39	45	(+)

Mizoram

School	% score on Challenge (BL)	% score on Challenge (ML)	Change
1009	58	56	(-)
1010	59	48	(-)
	49	53	(+)
1017	58	53	(-)
1022	59	46	(-)
1025	44	45	(+)
1027	50	47	(-)

Rajasthan

School	% score on Challenge (BL)	% score on Challenge (ML)	Change
1001	57	56	(-)
1027	64	48	(-)
1029	55	59	(+)
2012	42	65	(+)
2019	62	42	(-)
2022	50	53	(+)
2024	61	58	(-)


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