CLI

CONNECTED LEARNING INITIATIVE

CLIx Intervention in Mizoram

A Midline Review

Consolidated report of the Midline Survey (2017-18)

An initiative seeded by

TATA TRUSTS

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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 and is led by Tata Institute of Social Sciences, Mumbai and Massachusetts Institute of Technology, Cambridge, MA USA. CLIx offers a scalable and sustainable model of open education, to meet the educational needs of students and teachers. The initiative has won UNESCO's prestigious 2017 King Hamad Bin Isa Al-Khalifa Prize, for the Use of Information and Communication Technology (ICT) in the field of Education.

CLIx incorporates thoughtful pedagogical design and leverages contemporary technology and online capabilities. Resources for students are in the areas of Mathematics, Sciences, Communicative English and Digital Literacy, designed to be interactive, foster collaboration and integrate values and 21st century skills. These are being offered to students of government secondary schools in Chhattisgarh, Mizoram, Rajasthan and Telangana in their regional languages and also released as Open Educational Resources (OERs).

Teacher Professional Development is available through professional communities of practice and the blended Post Graduate Certificate in Reflective Teaching with ICT. Through research and collaborations, CLIx seeks to nurture a vibrant ecosystem of partnerships and innovation to improve schooling for underserved communities.

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

Any questions, suggestions or queries may be sent to us at:
contact@clix.tiss.edu

Centre for Education, Innovation and Action Research
Tata Institute of Social Sciences
V.N.Purav Marg, Deonar,
Mumbai – 400088, India
Phone: +91 – 22- 25525002/3/4
www.clix.tiss.edu

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Introduction

The second Midline study conducted in January- February 2018 aimed at assessing the impact of CLIx, a program implemented from the year 2016 in the state of Mizoram. This report attempts to make a comparison between the schools that have implemented CLIx[1] (Treatment group) with a subset of school that do not follow the CLIx program (Control Group).

The study also surveyed teachers and attempted to provide the status of teachers' access to technology and assess their usage of technology in teaching. It also examined teacher's beliefs regarding the integration of technology in education and also their overall subject preparedness.

School principals were also surveyed in the state of Mizoram wherein they were asked to report on their access to technology, usage of technology, beliefs about using technology in education, the role technology plays in improving education and also gauge an understanding into some of the concerns they perceive while integrating technology in school education and so on.

The table provided below gives the total number of students, teachers and principals that were surveyed in the state of Mizoram.

Table 1.1: Sample size for the survey in Mizoram

Designation	Total Number
Students	439 (Treatment), 91 (Control)
Teachers	20 (Treatment), 6 (Control)
Principals	20 (Treatment)

1.1. Students survey in Mizoram

In Mizoram, a total of 439 students from the treatment schools and 91 students from control schools were surveyed. Students were questioned about their access to technology and its usage. Students were asked the ease with which they were able to do the tasks on computer/mobile- do them on their own, do them with help and had never done before. For all the technical skills but one (internet based technology) students from treatment schools, on an average, are reported to have more technical skills compared to the control schools. Students from both treatment schools (27.73) and control schools (34.07) have reported that they use computer more often in their homes. Majority of the students (more than 50 percent from the valid responses) from treatment and control schools are in disagreement with most of the concerns for using technology. As an exception, the concern which is mostly agreed upon is about the fear to break or damage computer (50 percent from treatment school).

[1]These were schools where an average of 0.14 units of English module, and 0.3 units each of Maths and Science modules.

Among the four concerns, students from treatment schools are mostly in agreement with the fear that they 'break or damage' computer (50 percent) followed by the fear of making a mistake (49 percent). In control schools, students are mostly afraid of breaking a computer, making mistakes and that internet is a waste of time (44 percent). Based on the raw score, students from treatment schools, unlike the control schools, are found to disagree with the concerns about internet and computer usage. Students from treatment schools scored marginally lesser than the control school. Similar learning assessments were conducted to measure the level of understanding the students have in English, Mathematics and Science.

1.1.1. Performance of Students in Mathematics

- Students from treatment schools answered around 73% of the questions correctly and on an average student from the treatment group scored higher than those students from the control group in the mathematics assessment conducted.
- With respect to specific skills, on an average student from the treatment schools scored more than the control schools in all the sections.
- Inequality in performance among treatment schools was lower across all skills knowledge-based items.

1.1.2. Performance of students in Science

- 60 percent of the questions were answered correctly by the students from treatment schools while only 33 percent of the questions were answered correctly by the students in control schools. On an average student from treatment schools scored more than control schools in Science assessment.
- On average, students from treatment schools outperformed students from control schools except in the reasoning- based section.
- Inequality of performance in treatment schools was lesser across skills except in the knowledge based section. But the students from treatment schools have higher level of learning.

1.1.3. Performance of students in English

- Both the students from treatment schools and control schools have answered 80 percent of the questions correctly. Students from treatment schools scored better than students in the control schools for around 60% of the questions.
- Students from treatment schools performed better in both language specification and reading comprehension skills on an average, compared to control schools.
- Inequality of performance was higher among control schools for both language specification and reading comprehension.

1.1.4. Caste- Wise average scores

- In English, students from the ST category, SC and the BC category in the treatment group displayed better performances and students from the ST and "Other" category performed better in the control group.
- In Mathematics, students from ST category, SC and the General Category performed best in the treatment group. While in the control group, ST and "Other" category students showed the best performances.
- In Science, students from the ST, SC and General categories performed best in the treatment group and from the control group the BC and "Other" categories showed better performances than the others.

1.2. Teacher's survey in Mizoram

41% of teachers from treatment schools and 36% of teachers from control school reported never having used computers or laptops, while 36% of teachers from treatment and 54% of teachers from the control group utilized computers in the classrooms frequently.

Teachers were also surveyed about their beliefs regarding the use of technology and majority reported (Treatment (T) - 100% & 98% / Control (C) - 91% & 100%) that computers have helped improve students' learning and helped students to apply and practically relate to concepts they learn in textbook . Treatment school teachers stated that training and workshops, enthusiasm of the students and availability of working computers were the factors that influenced them to use technology in teaching, while control group teachers on the other hand indicated that teachers sharing their past experiences with technology and resource and support and mentoring were the factors that influenced them to integrate technology into their teaching

After implementing CLIx, English teachers (14 out of 17) reported that students were more confident to speak in English, 14 out of 16 Math teachers agreed that children were more interested in solving problems and Science teachers (10 out of 14) established that children began asking more questions.

Around 41% of treatment school teachers and 55% of control school teachers considered slow internet and large classroom sizes as an extreme challenge while trying to integrate technology into teaching. Equal percentage of teachers from both the groups also feel that use of technology will make it difficult to manage students in the class as they have difficulties with operation of a computer. Apart from this, teachers from all 3 domains agreed that shortage of computer hardware, shortage of support for using computers and shortage of instructional equipment for students' use, shortage of equipment for use in demonstrations and other exercises and inadequate physical facilities were some of the other challenges they would face.

Most teachers were somewhat prepared in most areas, some reported being relatively less prepared in topics such as appropriate communication and debating (English teachers), and Math teachers were somewhat prepared to teach relationship between three-dimensional shapes and two-dimensional shapes and so on. Finally, Science teachers felt less prepared to teach motion, light and variation (Physics), adaptation (Biology) and solutions (Chemistry).

There was a higher reported participation of teachers from treatment schools (40%) than control schools (32%) in the TPD workshops. Teachers expressed the need to include pedagogical tools and techniques and integration of technology in teaching as part of their TPD course. The most favorable modes of TPD training reported are interaction with peers, referring to books and hands-on activities, face- to face lectures and computer-based trainings.

1.3. Principal's survey in Mizoram

Majority of the principals (90%) in Mizoram have had access to computers. With regard to conferring importance to the different stakeholders in the adoption of technology, the highest importance was conferred to the subject expert, then class teacher and then computer teacher and the fourth ranking was given to principals. Principals were also questioned about the role of technology in education, most of the principals (80%) agreed that technology would help improve the student's board exam results, it would help deepen their understanding of the subject and that it would help them practice what was done in class.

In terms of the factors that help facilitate technology into education, most principals found that the support of teachers and educational officials to be the most important factor in helping to facilitate technology in education. Some of the other factors they considered important include support in handling repairs (60%), support in classroom management (90%) and batching of students and also ensuring lab functionality (90%). Majority (80%) found it essential to integrate technology into classrooms and did not believe that technology would disturb the existing relationship between teachers and students (90%), neither did they believe that it would increase their workload (60%) nor would it take time to complete the school curriculum (70%). 70 percent of the principals disagreed with the statement that their school had inadequate teachers for the integration of technology.

When questioned about their dependency on field resource, 90% of them agreed that dependency on field resource coordinators would reduce if there is a higher interest among teachers with regard to utilization of digital content, 80% believed that a high sense of ownership among teachers in the upkeep of lab functionality would also reduce dependency and finally 80% agreed that students taking initiative in the CLIx activities, it would reduce dependency.

2. STUDENTS GENERAL SURVEY

This report is based on the Second Midline study that was conducted in the period January-February, 2018 to assess the impact of CLIx that has been underway since 2016 in 461 schools in the states of Chhattisgarh, Mizoram and Rajasthan.

The impact study of CLIx comprises of a Baseline - Endline survey. First Midline study was conducted in April - May 2017 (Report Link). Data for the present study was collected in January-February 2018 in schools where teachers and students had been exposed to CLIx for a minimum of 1.5 academic years. The sample was selected purposively to cover schools where at least 4 CLIx student- modules had been rolled out. Telangana was not part of the Midline 2 survey as CLIx modules had not been implemented sufficiently enough for an evaluation. Along with the CLIx schools (treatment) a random sample of a subset of schools from the control group surveyed during baseline were also surveyed.

At the student level, the general survey was administered along with the learning assessment including the listening and speaking tool for communicative English. At the teachers' level, the general tool was administered along with the subject specific tools.

This second Midline will serve as a further data point for analysis of changes at the level of students and teachers in the states of Chhattisgarh, Mizoram and Rajasthan. The Baseline tool was altered to include new items, rephrase a few or add response options as was deemed necessary. The purpose of the second Midline is to presents findings from treatment schools in comparison with the control schools in the respective states. This is a report on the students' survey in Mizoram.

2.1. Demographics

In Mizoram, a total[1] of 439 and 91 students were surveyed from Treatment and control schools respectively. Almost 50 percent of the students surveyed were girls. Approximately, 22 and 32 percent of the students surveyed in treatment and control schools have history of repeating grade. More than 86 percent of the students surveyed belong to Scheduled Tribes (ST) in both treatment and control schools.

2.1.1. Parental Education

Majority of the students reported having parental education levels distributed between middle school and high school. A major proportion of the students reported not knowing their parental educational qualification. (Refer Table A1 in Annexure 1)

2.1.2. Parental Employment

In terms of parental employment, the student response indicated wide differences in mother's and father's occupations. In both treatment and control groups, high percentage (40.11, 42.47) of students reported that their fathers had regular salaried jobs. The daily wage earner category was the second most reported occupation in the father's occupation category in both treatment and control groups. A very small percentage of students reported to having unemployed fathers in both treatment and control groups. The unemployment levels in terms of mother's occupation was very high in both treatment and control groups with treatment faring better (47.26) than the control group (54.32). (Refer Table A2 in Annexure 1)

1 Since students have often given no response to few items, Total count of students and Total response (T.R.) does not match always. Every table on percentage distribution of students, reports the respective T.R. for the reporting purpose.

2.1.3. Educational and Economic Assets

Students were surveyed on a list of items to gauge their educational and economic background. While educational assets considered include seven items like internet, computer and the like, economic assets comprised of 11 items like car, livestock and others. On an average treatment schools reported having more of educational and economic assets when compared to control schools. (Refer Table A3 in Annexure 1)

2.2. Access and usage of Technology

This section tries to understand the different types of technical skills that students possess across the 3 states. Students were asked the ease with which they were able to do the tasks- do them on their own, do them with help and had never done before. Items on technical skills range from basic computer literacy skills like ability to start a computer to higher level skills like using simulations. This section further goes ahead to answer if there is any difference in the technical skills possessed by students in treatment and control schools.

2.2.1. Technical skills

The construct on Technical Skills constituted of 30 items of various levels of competence which ranges from ability to start a computer to use simulation. Based on Factor analysis, 4 factors emerged. The 4 factors refer to 'Application based technology', 'Basic technical skills', 'Internet based technology' and 'Intermediate computer skills'. Higher score for a skill would imply greater engagement (with or without help) with the items that factor together.

Table 2.1: Average level of Technical skills among Student

Items	**Factors**	**Treatment**				**Control**			
		Mean	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
Application based technology	F1= items 16, 17, 19, 20, 21, 23, 24, 25, 26, 27, 28	19.52	5	11	36	19.59	6	12	36
Basic technical skills	F2= items 1,2,3,5,7,8,9, 22	19.79	3	10	24	19.58	3	8	24
Items	**Factors**	**Treatment**				**Control**			
		Mean	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
Internet based technology	F3=items 11,12,13,14,29,30	12.58	3	6	18	13.06	3	6	18
Intermediate computer skills	F4= items 4,6,10	5.42	1	2	9	5.43	1	3	9

- For all the technical skills students from control schools, on an average, are reported to have more technical skills compared to the treatment schools.

2.2.2. Access to Computer

Students were enquired on the places where they have used computers frequently in the last three months prior to the survey.

Table 2.2: Frequency of Access to Computers by Students at Various Place

Places of Access	Treatment			T.R.	Control			T.R.
	Often	Sometimes	Never		Often	Sometimes	Never	
At home	27.73	37.73	34.55	439	34.07	23.08	42.86	91
At school	15.95	64.92	19.13	439	7.87	35.96	56.18	89
In an N.G.O or resource centre	3.41	14.32	82.27	439	3.3	9.89	86.81	91
Elsewhere (eg. Public kiosk, friends' home, internet cafe)	12.1	48.17	39.73	438	17.78	41.11	41.11	90

In the treatment group 27.73 percent of the students used computers at their homes while it was slightly higher in the control group which stood at 34.07 percent. In terms of computer usage at school 15.95 percent of students in the treatment group admitted to using computers often in schools while the corresponding number stood at 7.87 percent in the control group. A good percentage (17.78 percent) of students in the control group admitted to using computers on a frequent basis in public kiosks, internet cafes etc. This was slightly higher than the treatment group (12.1 percent).

2.3. Fear and Concerns about Use of Technology

Students from treatment and control schools were asked to rate their concerns and fears of using computer and internet on a 4-point scale ranging from strongly agree to strongly disagree.

Majority of the students (more than 50 percent from the valid responses) from treatment and control schools are in disagreement with most of the concerns for using technology. As an exception, the concern which is mostly agreed upon is about the fear to break or damage computer (50 percent from treatment school). (Refer Table A4 in Annexure 1)

2.3.1 Who are the most concerned to use technology?

For an overall understanding of how students fare on their level of fear across treatment and control school, raw score about 'fear' was generated. This score takes a maximum of 16 if a student is in 'strong agreement' with all the 4 items. On the other hand, if a student is in 'strong disagreement' with all the 4 items, 'fear' gets a minimum of 4. Higher the score, greater is the agreement with the fear or concern as a whole.

Table 2.3: Average level of fear and concern about technology between Treatment and Control

Treatment		Control	
Average	S.D	Average	S.D
9.36	2	9.20	2

Based on the raw score, students from treatment schools, unlike the control schools, are found to agree with the concerns about internet and computer usage. Students from treatment schools scored marginally more than the control school.

2.4. Academic Aspiration among Students

This section tries to understand how the students fare on their aspirations across states. This is mainly understood in terms of 1) whether they have any choice about the course they would like to pursue after 10th and 2) the highest educational qualification they wish to achieve.

When asked about the subjects they would like to study after 10th standard, majority of the students (36.61 percent) in the treatment schools indicated their interest in Arts, followed by Science which stood at 31.12 percent. In the control schools the highest preference drifted towards Science, accounting for 37.78 percent of the respondents followed by Arts (34.44 percent). A significant proportion of the students both in the treatment and control group indicated that they were undecided in their subject of interest, here the treatment group performed better than the control group. (Refer Table A5 in Annexure 1)

Students were asked about the level of education they would like to achieve. A majority of the students in the treatment and control group reported to not knowing the answer to the question (31.05 percent in treatment and 41.11 percent in control). 24.66 percent of the students in the treatment group wished to complete education till the 12th standard which was 22.22 percent in the control group. Coming in third was graduation in a professional course which was almost similar across treatment and control groups.(Refer Table A6 in Annexure 1)

Student Aspiration is analyzed with the help of a categorical variable which takes the value of 2, 1 and 0 which denotes that students have an idea of both the course and degree or at least 1 of the two or none. While 5.2 percent students from Treatment are not sure about either the course or degree they wish to pursue after 10th, 62.4 percent are reported to be clear about both. In the control schools, on the other hand, fewer students (50.5 percent) are clear about both the choices and larger number of students (8.7 percent) tends to have no such clarity. (Refer Table A7 in Annexure 1)

3. STUDENTS LEARNING ASSESSMENT

Students were also surveyed to gauge their level of understanding in English, Math and Science. This section includes 1) Question specific analysis of student response, 2) performance of students in terms of total score attained in each domain, 3) performance of students in skills of specific interest and 4) Level of difficulty student faced to answer these questions. The objective of this section is to understand how different the students from treatment schools are in comparison to those of control schools. The analysis is presented domain-wise.

The analysis of the student learning assessment is done in two parts: Firstly, for each domain, total scores were analyzed for each question and for each skill. The purpose is to compare average performance of students between treatment and control schools on each of the skill and on the overall domain performance. Secondly, skill-wise scores have been also compared in each domain for a general understanding of how students fare in each skill. Since the purpose of this report is to have an elaborate understanding of student responses, this section considers all the 40 domain questions for the purpose of preliminary analysis[2].

3.1 Performance of Students in Mathematics

3.1.1 Question specific analysis of student response

- By and large more than 30 percent of the students in treatment have answered majority of the questions (73 percent) correctly. On the other hand, more than 30 percent of the students, in control schools have answered 47 percent of the questions correctly.

- Percent of the students who indicated option 'Don't Know, Can't Say' varied across questions. In particular for Q7 and Q8 from Mathematics domain, more than 20 percent of the students from both treatment and control indicated 'Don't Know, Can't Say'.

- More than 60 percent of the students belonging to the category of top 30 percent students from treatment schools correctly answered 9 questions (Q1, Q2, Q5, Q6 Q8, Q10, Q11, Q12, Q13 and Q15). Q14 proved to be most difficult for majority the students in the same category. Among the bottom 30 percent from the treatment schools, Q5 and Q10 were the easiest and Q14 was the most difficult.

- More than 60 percent of the students belonging to the category of top 30 percent students from control schools correctly answered 4 questions (Q1, Q2, Q5 and Q6). Q14 proved to be most difficult for majority the students in the same category. Among the bottom 30 percent from the control schools, Q1 was the easiest and Q14 was the most difficult.

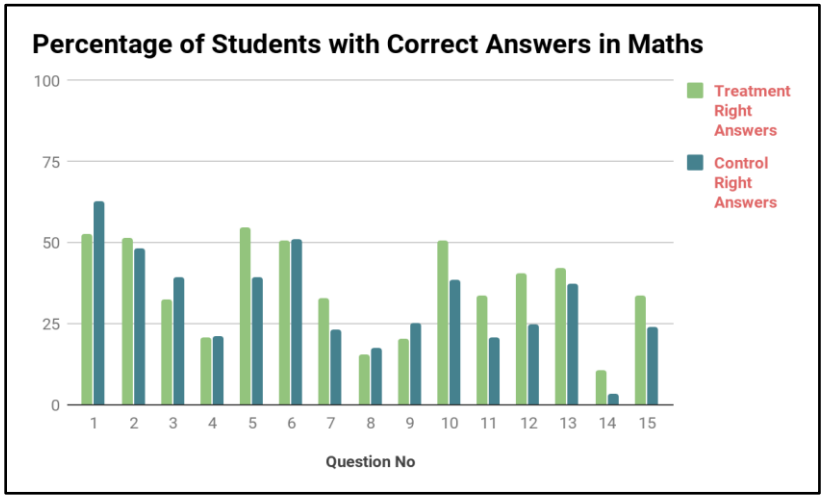
2 This analysis is not based on Item Discriminant analysis

The table below gives a detailed understanding of how students performed on each item.

Table 3.1: Itemized student response to Mathematic Assessment

Question No	Question-wise Responses						Percentage of Students with Correct Response from Top and Bottom 30 %			
	Treatment			Control			Treatment		Control	
	Right Answers	Wrong	Don't Know	Right Answers	Wrong	Don't Know	Top 30 %	Bottom 30%	Top 30 %	Bottom 30%
1	52.73	31.82	15.45	62.64	19.79	17.58	85	23	89	37
2	51.6	43.15	5.25	48.35	43.96	7.69	79	24	89	11
3	32.35	56.26	11.39	39.56	46.15	14.29	51	17	56	15
4	20.78	67.58	11.64	21.35	66.29	12.36	40	8	48	7
5	54.67	39.41	5.92	39.56	50.55	9.89	79	30	63	22
6	50.57	29.84	19.59	51.11	29.99	18.89	86	17	89	15
7	33.03	42.14	24.83	23.08	56.05	20.88	54	14	33	4
8	15.45	58.64	25.91	17.58	54.95	27.47	23	8	26	15
9	20.27	62.42	17.31	25.27	56.03	18.68	33	8	56	7
10	50.68	42.01	7.31	38.46	54.95	6.59	67	30	59	30
11	33.79	57.77	8.45	20.88	70.33	8.79	67	11	26	11
12	40.64	47.03	12.33	24.72	56.18	19.1	80	11	59	4
13	42.14	47.6	10.25	37.36	52.74	9.89	64	15	56	11
14	10.71	70.84	18.45	3.3	80.22	16.48	11	5	4	0
15	33.87	43.02	23.11	24.18	57.14	18.68	61	12	59	4
Total	**439**			**91**			**132**	**132**	**27**	**27**

Figure 1: Percentage of students with Correct Answers in Mathematics



- Out of 15 questions, students from treatment schools have out-performed those from control schools, in majority of the questions.
- Above 50 percent of the students in treatment schools could correctly answer Q1, Q2, Q5, Q6 and Q10.

3.1.2 Performance of students in Mathematics

This section discusses the analysis of total score attained in Mathematics and how they fare on skills of specific interest. This is to understand if students from treatment are any better than those in control schools. Skills of interest in Mathematics domain include - Knowledge (5 items), Application (5 items) and Reasoning (5 items).

Table 3.2: Skill-wise Performance of Students in Mathematics

Mathematics skills	Treatment				Control			
	Lowest score	Highest Score	Mean	SD	Lowest score	Highest Score	Mean	SD
Total score obtained	0	93.33	36.14	18	0	73.33	31.72	17
Knowledge-based items	0	100	36.76	22	0	80	33.18	19
Application-based items	0	100	36.99	25	0	100	34.06	25
Reasoning-based items	0	100	34.66	25	0	80	27.91	24

Total Score:

- On an average, students from treatment schools performed better in Mathematics.
- Highest marks obtained were 93.33 and 73.33 in case of Treatment and Control schools, respectively.

Knowledge-based items:

- On an average, students from treatment schools performed better in Mathematics.
- Highest marks obtained were 100 and 80 in case of Treatment and Control schools, respectively.

Application-based items:

- On an average, students from treatment schools performed better in Mathematics.
- Highest score obtained was 100 percent, both for treatment and control schools

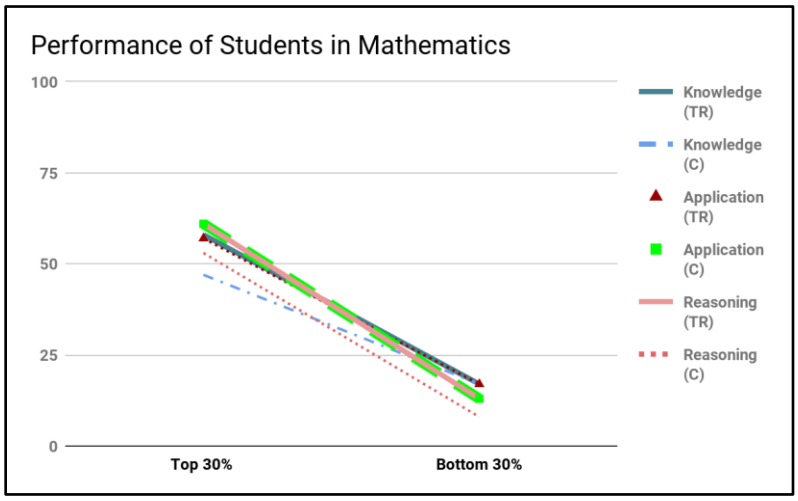
Reasoning-based items:

- On an average, students from treatment schools performed better in Mathematics.
- Highest marks obtained were 100 and 80 in case of Treatment and Control schools, respectively.

3.1.3 Level of difficulty student faced to answer these questions

Skill-wise performance graphs for 2 groups - treatment and control schools were constructed to understand 1) how diversified were student performance within each group and 2) how the performance varies across the groups. Performance graphs constitute of percentage of total correct answers by the top 30 percent and the bottom 30 percent within each group. A steeper curve represents more dispersed performance (inequality of performance) within a group. On the other hand, a horizontal curve represents a case of perfect equality. Higher the curve better is the overall performance for the particular group. Dotted lines refer to Control Schools and the bold lines refer to treatment schools.

Figure 2: Performance of Students in Mathematics



Knowledge-based items:

- In terms of knowledge based skill, students from the top 30 percent in the treatment have scored more than the top 30 percent in the control schools. However the difference in performance for the bottom 30 percent across treatment and control group was lesser.
- Inequality of performance was higher among treatment group.

Application-based items:

Graphs for this skill, for both control and treatment merge with other graphs. But a closer look show:

- Percentage of correct response to application based items was lesser for the top 30 percent from the treatment schools as compared to those in the control schools. On

the other hand, percentage of correct response for the same was more for the top 30 percent from the treatment schools as compared to those in the control schools.

- On the whole Inequality of performance was higher among control group.

Reasoning-based items:

- Both the Control and Treatment schools have similar variation in overall student performance in terms of reasoning-based skill.
- Students from Treatment schools tend to have better understanding of reasoning skills than students in control school.

3.2. Performance of students in Science

3.2.1 Question specific analysis of student response

The table below gives a detailed understanding of how students performed on each item.

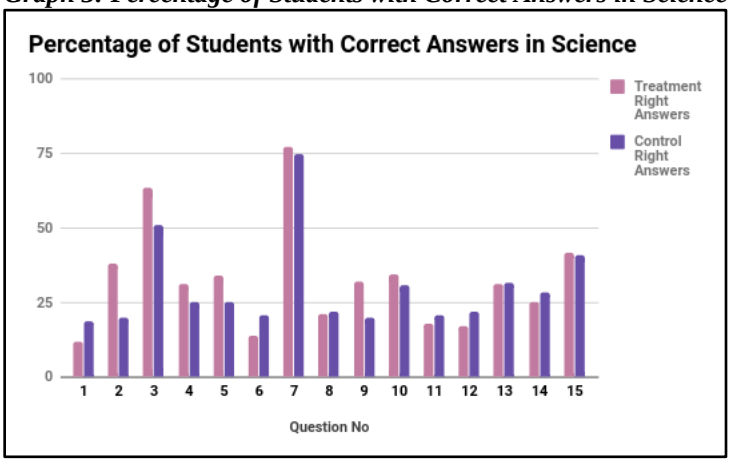
Table 3.3: Itemized student response to Science assessment

Question No	Question-wise Responses						Percentage of Students with Correct Response from Top and Bottom 30 %			
	Treatment			Control			Treatment		Control	
	Right Answers	Wrong	Don't Know	Right Answers	Wrong	Don't Know	Top 30 %	Bottom 30%	Top 30 %	Bottom 30%
1	11.85	61.5	26.65	18.68	67.03	14.29	22	4	30	11
2	38.13	42.23	19.63	20	53.33	26.67	58	20	37	7
3	63.62	21.51	14.87	51.11	28.89	20	91	31	81	15
4	31.28	60.96	7.76	25.27	67.03	7.69	54	12	33	11
5	34.1	53.78	12.13	25.27	64.84	9.89	54	20	37	15
6	13.76	56.2	30.05	20.88	56.04	23.08	17	5	26	7
7	77.45	20.04	2.51	74.73	17.59	7.69	98	55	89	52
8	21	58.22	20.78	21.98	63.74	14.29	39	11	44	15
9	31.96	47.94	20.09	19.78	61.54	18.68	55	11	33	7
10	34.47	44.07	21.46	30.77	45.06	24.18	56	15	56	7
11	18.08	52.86	29.06	20.88	46.16	32.97	20	9	33	15

12	17.27	48.63	34.09	21.98	35.16	42.86	24	9	33	11
13	31.18	48.97	19.86	31.87	54.95	13.19	58	8	52	4
14	25.23	64.55	10.23	28.57	61.54	9.89	34	14	48	22
15	41.69	37.81	20.5	41.11	37.78	21.11	61	26	44	33
Total	**439**			**91**			**132**	**132**	**27**	**27**

- By and large 30 percent of the students from Treatment schools (60 percent questions) and control schools (33 percent questions) have answered correctly.
- More than 10 to 30 percent of the students in both treatment and control indicated option 'Don't Know Can't Say'.
- In top 30% of the students in treatment school, above 50 percent of the students found 9 questions (Q2, Q3, Q4, Q5, Q7, Q9, Q10, Q13 and Q15) easier. Q6 in the Science was found to be difficult by most of the students. For the bottom 30 percent, Q1, Q6, Q11, Q12 and Q13 are the most difficult questions.
- In top 30% of the students in control school, above 50 percent of the students found 4 questions (Q3, Q7, Q10 and Q13) easier. Q6 in the Science was found to be difficult by most of the students. For the bottom 30 percent, Q2, Q6, Q9, Q10 and Q13 are the most difficult questions.

Graph 3: Percentage of Students with Correct Answers in Science



- In 8 out of 15 questions, students from treatment schools have out-performed those control schools.
- More than 50 percent of the students have answered 2 questions correctly.

3.2.2 Performance of students in specific Skills in Science

This section discusses the analysis of total score attained in Science and how they fare on skills of specific interest. This is to understand if students from treatment are any better than those in control schools. Skills of interest in Science domain include - Knowledge (5 items), Application (7 items) and Reasoning (3 items).

Table 3.4: Skill-wise Performance of Students in Science

Science skills	Treatment				Control			
	Lowest score	Highest Score	mean	SD	Lowest score	Highest Score	mean	SD
Total score obtained	0	73.33	32.99	14	0	60	30.62	12
Knowledge-based items	0	100	42.52	21	0	83.33	35.71	20
Application-based items	0	100	29.91	20	0	66.66	28.93	18
Reasoning-based items	0	100	20.12	23	0	100	23.80	24

Total Score:

- On average, students from Treatment scored better than the control schools.
- Highest score obtained was 73.33 and 60 percent, for treatment and control schools respectively.

Knowledge-based items:

- On an average, students from treatment schools performed better.
- Highest marks obtained were 100 and 83.33 percent in case of treatment and control schools respectively.

Application-based items:

- On an average, students from treatment schools performed better.
- Highest score obtained was 100 and 66.66 percent, for treatment and control schools, respectively.

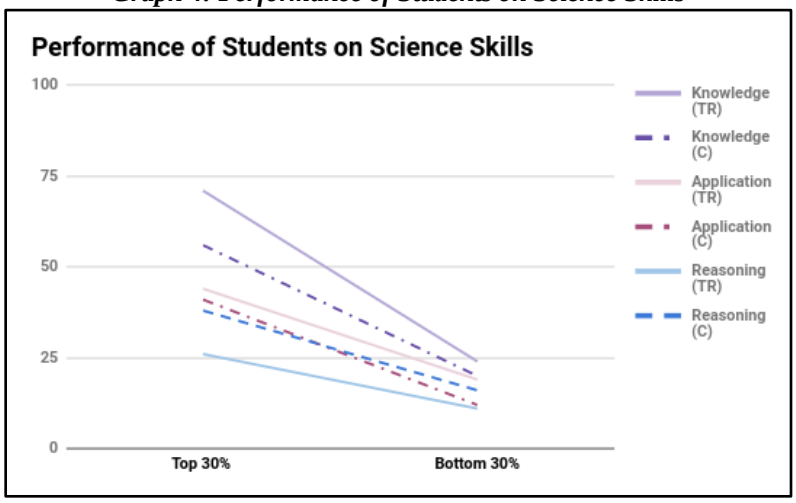
Reasoning-based items:

- On average, students from control scored better to the treatment schools.
- Highest score obtained was 100 percent, both for treatment and control respectively.

3.2.3 Level of difficulty student faced to answer these questions

Skill-wise performance graphs for 2 groups - treatment and control schools were constructed to understand 1) how diversified were student performance within each group and 2) how the performance varies across the groups. Performance graphs constitute of percentage of total correct answers by the top 30 percent and the bottom 30 percent within each group. A steeper curve represents more dispersed performance (inequality of performance) within a group. On the other hand a horizontal curve represents a case of perfect equality. Higher the curve better is the overall performance for the particular group.

Graph 4: Performance of Students on Science Skills



Knowledge-based items:

- Students from the top 30 percent in the treatment have scored more than the top 30 percent in the control schools. Also, students from the bottom 30 percent in the treatment have scored more than the bottom 30 percent in the control schools
- Though inequality of performance was higher among treatment group, the students from these schools have higher level of learning.

Application-based items:

- Students from the top 30 percent in the treatment have scored more than the top 30 percent in the control schools. Also, students from the bottom 30 percent in the treatment have scored more than the bottom 30 percent in the control schools
- Overall levels of application in Science are higher among the students from the treatment group.
- Inequality of performance was higher among control group.

Reasoning-based items:

- Students from the top 30 percent in the treatment have scored lesser than the top 30 percent in the control schools. Also, students from the bottom 30 percent in the control have scored more than the bottom 30 percent in the treatment schools
- Overall level of reasoning is higher among students from control schools.
- However, Inequality of performance was lesser among treatment group.

3.3 Performance of Students in English

This Section includes analysis of subject specific understanding of the students from both treatment and control schools followed by a brief understanding of how students from treatment school fare on their listening and speaking skills. The second exercise has been conducted for a smaller sample selected randomly from the students surveyed for the first exercise.

3.3.1 Question specific analysis of student response

The table below gives a detailed understanding of how students performed on each items.

Table 3.5: Itemized student response to English Learning assessment

Question No	Question-wise Responses						Percentage of Students with Correct Response from Top and Bottom 30 %			
	Treatment			Control			Treatment		Control	
	Right Answers	Wrong	Don't Know	Right Answers	Wrong	Don't Know	Top 30 %	Bottom 30%	Top 30 %	Bottom 30%
1	68.04	26.94	5.02	53.85	38.45	7.69	96	41	89	11
2	46.92	48.52	4.56	47.25	49.45	3.3	73	25	85	15
3	37.7	59.07	3.22	31.46	61.8	6.74	52	30	52	15
4	56.85	36.76	6.39	53.85	39.55	6.59	90	17	96	7
5	53.21	33.95	12.84	52.75	32.97	14.29	89	20	93	7
6	72.27	19.09	8.64	62.64	29.67	7.69	100	32	93	22
7	74.26	17.09	8.66	67.03	25.27	7.69	96	47	96	37
8	66.51	29.39	4.1	53.85	41.76	4.4	85	36	85	30
9	70.8	23.45	5.75	79.12	15.39	5.49	94	33	89	63
10	79.55	12.04	8.41	84.62	9.9	5.49	99	43	100	63
Total	**439**			**91**			**132**	**132**	**27**	**27**

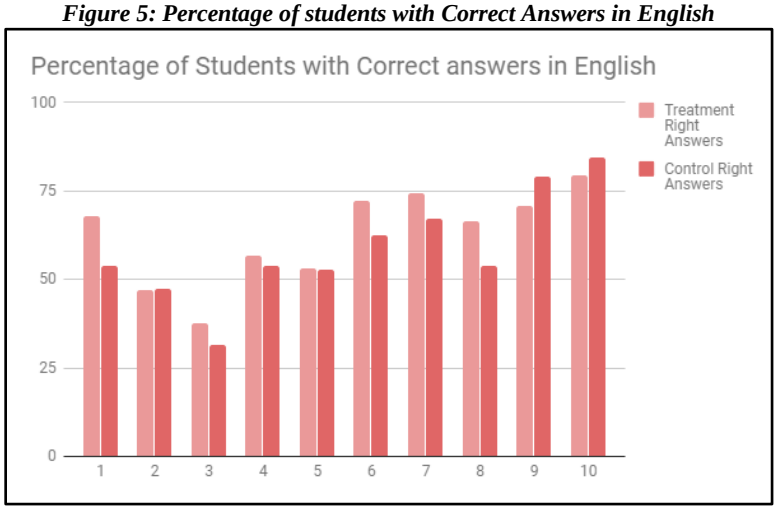
- By and large, less than 50 percent of the students have answered 80 percent of the questions correctly in both treatment and control schools.
- On each of the item of assessment, less than 10 percent of the students indicated the option 'Don't Know Can't Say'.
- In the category of top 30 percent[3] of the students in treatment school, more than 90 percent of the students could answer 6 questions Q1, Q4, Q6 Q7, Q9 and Q10 correctly.

3 Each student has been scored according to the number of the correct answer they have chosen out of the total questions in each domain. The category is made by taking the total number of the students and grouped them into three categories, such as top 30% , middle 40% and bottom 30% according to the highest score .

All questions were answered correctly by at least 50 percent of the students in top 30 percent in the treatment schools. Whereas, none of the questions were answered correctly by 50 percent of the students in the bottom 30 percent in treatment schools.

- In the control schools, in the category of top 30 percent, 90 percent of the students could answer 5 questions (Q4, Q5, Q6, Q7 and Q10) correctly. All questions were answered correctly by at least 50 percent of the students in top 30 percent in the control schools. Whereas, none of the questions were answered correctly by 50 percent of the students in the bottom 30 percent in control schools.

Figure 5: Percentage of students with Correct Answers in English



- For most of the questions, 50 percent of the students were found to answer correctly, in both treatment and control.
- Out of 10 questions being asked, students from treatment schools scored more than those in the control schools.

3.3.2 *Performance of students in English*

This section discusses the analysis of total score attained in English and how they fare on skills of specific interest. This is to understand if students from treatment are any better than those in control schools. Skills of interest in English domain include - Language specific skill (6 items), Reading comprehension skill (3 items) and Writing skill (1 item). Owing to presence of only one item under Writing Skill, this item is only assessed in terms of descriptive analysis.

Table 3.6: Student Scores in Skills of Specific Interest

English skills	**Treatment**				**Control**			
	Lowest score	Highest Score	mean	SD	Lowest score	Highest Score	mean	SD
Total Score obtained	0	100	62.39	24	0	100	58.57	25
Language specification	0	100	59.11	25	0	100	52.56	29
Reading Comprehension	0	100	72.13	33	0	100	72.52	28

Total Score:

- On average, students from treatment scored better than the control schools
- Highest score obtained was 100 percent, both for treatment and control schools

Language Specification:

- On average, students from treatment scored better than the control schools
- Highest score obtained was 100 percent, both for treatment and control schools

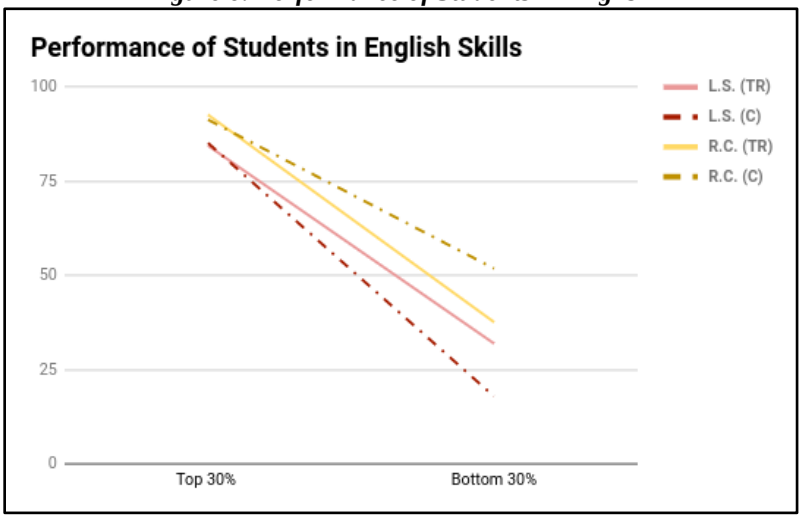
Reading Comprehension:

- On average, students from Treatment scored almost similar to the control schools
- Highest score obtained was 100 percent, both for treatment and control schools.

3.3.3 Level of difficulty student faced to answer these questions

Skill-wise performance graphs for each group - treatment and control schools, were constructed to understand 1) how diversified were student performance within each group and 2) how the performance vary across the groups. Performance graphs constitute of percentage of total correct answers by the top 30 percent and the bottom 30 percent within each group. Bold lines denote the performance in language specification and reading skill, within treatment group and dotted lines represents performance within control group. A steeper curve represents more dispersed performance within a group and higher curve represents overall better performance. On the other hand a horizontal curve represents a case of perfect equality.

Figure 6: Performance of Students in English



Language Specification:

- Students from bottom 30 percent category scored more in treatment schools compared to control schools.
- Inequality of performance was higher among control group.

Reading Comprehension:

- Students from bottom 30 percent category scored less in treatment schools compared to control schools.
- Inequality of performance was higher among control group.

Also, as shown in the above graph, in Mizoram, inequality in performance in both the skills is lesser in treatment schools. Between the two skills, students are better skilled in reading comprehension.

3.3.4. Performance of students in English Listening and speaking

Listening and Speaking Assessment was administered on the Open Data Kit (ODK) to assess the Listening and Speaking skills of students.

This assessment was done for 47 students from five randomly selected treatment schools in Mizoram. Five listening comprehension questions (refer to Annexure 3b.2) were based on simple audio situations and tested students on global comprehension, listening for specific information and inferential skills. Here again students had to choose the right answer after listening to the audio clips a maximum of two times.

Table 3.7: Performance of students on listening comprehension questions

Item#	Item Type	Percent of students who marked the right answers:
1	Listening for specific information	34.04%
2	Listening for specific information	48.94%
3	Global Comprehension	19.15%
4	Inference	34.04%
5	Global Comprehension	57.45%

Students overall performance in listening was average. Item 3 showed poor performance and item 5 showed high performance.

The 8 questions (refer to Annexure 3b.1) in the speaking section assessed ability in understanding instructions in English, pronunciation, word choice, grammatical accuracy, fluency and presentation of ideas. Here is the rating given by FSPs on the rubric.

Table 3.8: Performance of Students on Speaking skills

FSP's feedback on Student Performance (% of students)						
Usage of English	**Very poor**	**Poor**	**Average**	**Good**	**Very Good**	**Excellent**
Understands instructions in English		6.38	23.40	27.66	25.53	17.02
Pronunciation		6.38	31.91	34.04	25.53	2.13
Word Choice		10.64	38.30	29.79	19.15	2.13
Grammatical Accuracy		10.64	36.17	34.04	19.15	
Fluency	2.13	12.77	31.91	36.17	14.89	2.13
Presentation of Ideas		6.38	31.91	46.81	12.77	2.13

The feedback above indicates that most of the students are rated from average to very good. And also few students were rated as excellent particularly for understanding instructions in English.

3.4. Who are the achievers?

Table 3.9: Caste-Wise Average Score in English Domain

		ST	**SC**	**BC**	**OBC**	**General**	**Other**
Treatment	**Total Score**	65	64	50	43	43	45
	Language Specification	61	62	42	44	40	44
	Reading Comprehension	74	76	67	42	50	54
Control	**Total Score**	61	-	30	-	-	60
	Language Specification	57	-	17	-	-	54
	Reading Comprehension	72	-	67	-	-	75

- In the English domain, the students from the SC category performed best in the Language Specification section followed by ST students in the treatment group. The same trend was observed in the Reading Comprehension section of the questions.
- In the control group, ST students performed the best followed by the 'Other' category students in the Language Specification section. While in the Reading Comprehension

section the 'Other' category students performed the best followed by the ST students.

- Since a number of caste categories were missing in the control schools comparisons between total scores across treatment and control cannot be made.

Table 3.10: Caste-Wise Average Score in Mathematics Domain

		ST	SC	BC	OBC	General	Other
Treatment	**Total Score**	37	37	28	20	36	33
	Knowledge	38	40	10	20	34	32
	Application	37	36	45	30	40	32
	Reasoning	36	36	30	10	34	35
Control	**Total Score**	33	-	13	-	-	25
	Knowledge	35	-	0	-	-	20
	Application	34	-	0	-	-	45
	Reasoning	30	-	40	-	-	10

- In mathematics, students from the SC category performed the best followed by ST students in the Knowledge section of the questions in the treatment group. In the case of the Application based questions, students from the BC category performed the best followed by General Category students. In the Reasoning based questions SC and ST category students performed the best and scored equally.
- In the control group, the 'Other' category students performed best in the Application based question while students of the BC category performed best in the Reasoning based questions. In the knowledge based section ST students performed the best. Most of the caste categories were not available in the control group as compared to the treatment group.
- Since a number of caste categories were missing in the control schools, comparisons between total scores across treatment and control cannot be made.

Table 3.11: Caste-Wise Average Score in Science Domain

		ST	SC	BC	OBC	General	Other
Treatment	**Total Score**	34	33	22	24	30	24
	Knowledge	44	33	17	33	37	29
	Application	31	38	33	17	22	21
	Reasoning	19	24	8	21	33	21
Control	**Total Score**	31	-	33	-	-	37
	Knowledge	36	-	33	-	-	38
	Application	29	-	50	-	-	38
	Reasoning	23	-	0	-	-	33

- In the Science domain, students of the ST category performed the best in the knowledge based questions followed by General category students in the treatment group. In the Application based questions SC students performed the best followed by the BC category students. In the reasoning based questions, General category students performed the best followed by SC students.
- In the control group, the 'Other' category students performed best in the Knowledge based questions and Reasoning based questions. In the Application based questions students from the BC category performed the best.
- Since a number of caste categories were missing in the control schools, comparisons between total scores across treatment and control cannot be made.

4. KEY FINDINGS (STUDENTS)

Some key findings from the Midline study for CLIx schools in Rajasthan are as under:

General

- In Mizoram, students from Control Schools are better versed with all the four technical skills.
- Students from treatment schools reported using computers more than those in control schools. In particular, they tend to use it more in schools.
- On average students from treatment schools are more concerned about use of technology.
- Compared to control schools, students from treatment schools fare better in their academic aspiration.

Performance in English:

- For 60 percent of the questions, students from treatment schools have outperformed those in control schools. On average students from treatment schools scored more than Control schools in English assessment.
- In terms of specific skills, though there was not much difference in the Reading skill, students from treatment schools on an average scored more in Language specification skills as compared to control.
- In terms of difficulty level, unlike reading skills, students from treatment find language specific skill less difficult.
- Inequality of performance is less for language specific skill for treatment schools.

Performance in Mathematics:

- For 60 percent of the questions, students from treatment schools have outperformed those in control schools. On average students from treatment schools scored more than Control schools in Mathematics assessment.
- In terms of specific skills, unlike control schools, students from treatment schools on an average scored more in all the three skills - knowledge, application and reasoning based skills.
- In terms of level of difficulty, unlike control, students from treatment found questions on reasoning skills less difficult.
- Inequality in performance in high in treatment schools.

Performance in Science:

- For 47 percent of the questions, students from treatment schools have outperformed those in control schools. On average students from treatment schools scored more than Control schools in Science assessment.
- In terms of specific skills, unlike control schools, students from treatment schools on an average scored more in 2 skills - knowledge and application.
- In terms of level of difficulty, unlike control, students from treatment found questions on knowledge and application based skills less difficult.
- With respect to application based skill, it is also a more equal performance by top 30 percent and bottom 30 percent in treatment schools.

ANNEXURE -1

A1: Parental Education Levels in Treatment and Control Groups

Education level	Treatment		Control	
	Mother	Father	Mother	Father
Never attended school	4.56	2.52	5.62	4.49
Studied only until primary school (Grade 1-5)	11.85	9.17	12.36	12.36
Studied only until middle school (Grades 6-8)	21.87	21.79	20.22	23.6
Studied only until high school (Grade 9-10)	28.02	25.23	26.97	22.47
Studied only until Grade 12/ PUC/ Junior College	7.29	11.47	4.49	4.49
Studied in a Polytechnic college (Diploma)	0.46	1.83	0	0
Studied in a degree college (B.A./B.Com./B.Sc./B.E.)	3.42	5.73	6.74	11.24
Studied in a University (M.A./M.Sc./M.Tech.)	1.37	3.9	2.25	0
I do not know	21.18	18.35	21.35	21.35
T.R.	439	436	89	89

A2: Parental Employment Categories in Treatment and Control Groups

Occupation	Treatment		Control	
	Mother	Father	Mother	Father
Regular salaried	9.70	40.11	17.28	42.47
Self-employed	29.10	25.47	13.58	17.81
Daily wage earner	13.93	28.73	14.81	32.88
Unemployed	47.26	5.69	54.32	6.85
T.R.	402	369	81	73

A3: Distribution of Educational and Economic Assets Amongst Students

Control/treatment	Assets	No of students	Lowest score	Highest	Mean	SD
Treatment	Educational Asset	439	1	7	4.68	1
	Economic asset		0	11	5.45	1

Control	Educational Asset	91	0	7	4.49	1
	Economic asset		0	11	5.09	1

A4: Levels of Fear and Concerns Regarding Technology Use Amongst Students

Questions	**Treatment**				**T.R.**	**Control**				**T.R**
	S.A.	**A**	**D**	**S.D**		**S.A.**	**A**	**D**	**S.D.**	
If given an opportunity to use a computer, I am afraid I may break or damage it.	7	43	38	11	438	11	33	40	16	91
I hesitate to use computer because I may make a mistake.	6	43	38	13	439	2	42	41	15	91
I don't think computers can help me with my studies.	11	29	40	21	437	12	29	31	29	91
Surfing on internet is a waste of time.	9	28	41	21	437	10	34	30	26	91

A5: Percentage of students Opting for Various Courses

Control/treatment	Science	Arts	Commerce	Vocational /technical courses	Fine Arts	Get job/get married	Undecided	TR
Treatment	31.12	36.61	12.59	2.75	3.89	2.06	10.98	437
Control	37.78	34.44	6.67	1.11	2.22	2.22	15.56	90

A6: Percentage of students Indicating their preference for Various academic qualification

Treatment/control	Grade 10th	Grade 12th	Vocational course	General Graduation	Graduation in Professional course	Post-Graduation	Don't Know	T.R.
Treatment	8.68	24.66	5.25	8.22	15.07	7.08	31.05	438
Control	7.78	22.22	3.33	4.44	15.56	5.56	41.11	90

A7: Aspiration level across Treatment and Control

Treatment/control	No idea about degree or course	Some idea about either degree or course	Clear about both degree and course
Treatment	5.2	32.3	62.4
Control	8.7	40.6	50.5

ANNEXURE -2

Technical Skills:

How well can you do the following activities on computer? Choose the most appropriate response from the 3 options for each of these activities:

(Options- i) Can do it on my own, ii) Can do it but with some help, iii) Have never done it

Items under F1, F2, F3 and F4 in Technical skills

Application based technology (F1)	**Basic Technical Skills** (F2)	**Internet based technology** (F3)	**Intermediate computer skills** (F4)
Use GeoGebra	Start a computer	Use email	Work on spreadsheet
Use Turtle logo	Handle a mouse	Use chat online	Work on a Word file
Use simulation	Save files	Download/upload files	Use hyperlinks (links that directs to another site)
Use online maps	Drawing using Inkscape (paint)	Record audio/video	
Book a ticket online	Type in English	Download & use apps on the mobile phone	
Fill online form	Type in Hindi/Mizo/Telugu	Shop online	
Logging into platform	Use internet browser (for e.g. Google Chrome)		
Use buddy login	Play computer games		
Rate comments on platform			
Write comments on platform			
Use video conferencing tools like Skype			

ANNEXURE -3

A. Student Learning Assessment Tool

Section A: English

1. The clouds are dark. It …… rain soon. *[Language based]*

1. can
2. may
3. should
4. must
5. Don't know the answer

2. Anam: We had to submit the Science homework yesterday.
Sara: Oh, I forgot! What day _____ it yesterday? *[Language based]*

1. is
2. were
3. was
4. will
5. Don't know the answer

3. City life is different …… village life. *[Language based]*

1. than
2. from
3. to
4. then
5. Don't know the answer

4. You are in a park. You need to get to the toilet. How would you ask for help? *[Language based]*

1. I am looking for the toilet. Can you find it for me?
2. Could you please show me the way to the toilet?
3. I want a toilet. Help, please!
4. Tell me where is the toilet.

5. Don't know the answer

5. Sohum was late to school. The Principal scolded him. Which of the following is the best way to rewrite this in one sentence? *[Writing based]*

1. In spite of being late, Sohum was scolded.
2. Although he was late, Sohum was scolded.
3. Sohum was late, but he was scolded.
4. Sohum was scolded because he was late.
5. Don't know the answer

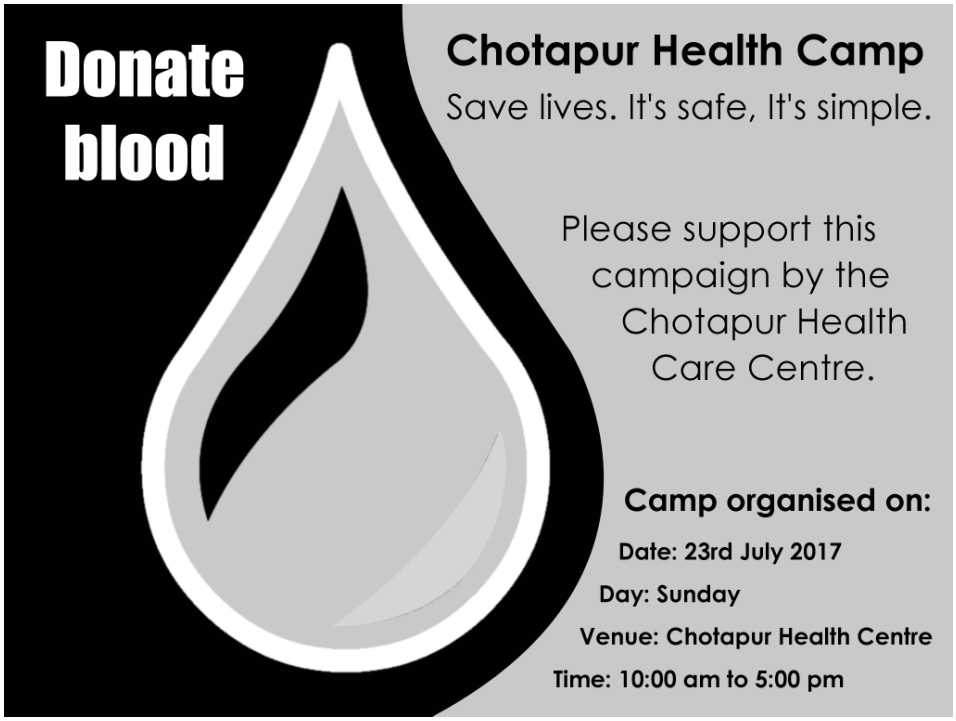
6. Sunithi rode her bicycle rashly and hit an old man on the road. What is the correct thing to say in this case? *[Language based]*

1. Why can't you walk on the pavement, uncle?
2. Thank you for stopping me, uncle.
3. I'm very sorry, uncle. I hope you aren't hurt.
4. Will you please let me pass?
5. Don't know the answer

7. Sunithi said sorry to the old man. He forgave her and wanted to know her name. How will Sunithi introduce herself? *[Language based]*

1. Don't you know who I am?
2. Myself, Sunithi, studying in 7th standard.
3. Hello, I'm Sunithi. I study in the 7th standard.
4. Why do you want to know my name?
5. Don't know the answer

Look at the Poster and answer the questions 8-10



8. Look at the Poster and answer the question:
What is the poster about? *[Reading comprehension]*

1. Being safe
2. Saving lives
3. Donating blood
4. A health care camp
5. Don't know the answer

9. Look at the Poster and answer the question:
When will the event end? *[Reading comprehension]*

1. 3 p.m
2. 5 p.m.
3. 9 a.m.
4. 10 a.m.
5. Don't know the answer

10. Look at the Poster and answer the question:
Who is organising the campaign? *[Reading comprehension]*

1. Chotapur Health Care Centre
2. Chotapur District Collector
3. Chotapur Government Hospital
4. Chotapur Gram Panchayat
5. Don't know the answer

Section B: Science

1. Pick the correct option to fill in the blank:
Phases of the moon are caused because……. *[Application based]*

1. something covers the moon.
2. the earth's shadow falls on the moon.
3. only a part of lit half of the moon is visible from the earth.
4. the moons orbit makes an angle of 5 degrees with the orbit of the earth.
5. Don't know the answer.

2. Pick the correct option to fill in the blank:
The maximum number of electron in L (2nd) shell of an atom is ….. *[Knowledge based]*

1. 18
2. 2
3. 8
4. 4
5. Don't know the answer

3. If a cycle travels with the average speed of 50 meter/minute, what distance it would cover in 5 minutes? *[Knowledge based]*

1. 150 m
2. 250 m
3. 2250 m
4. 100 m
5. Don't know the answer

4. Pick the correct option to fill in the blank:
Sound does not travel through…… *[Knowledge based]*

1. Solids
2. Liquids
3. Air
4. Vacuum
5. Don't know the answer

5. Which is the part of the body where blood and air mix? *[Knowledge based]*

1. Heart
2. Lung
3. Liver
4. All of the above
5. Don't know the answer

6. If you cover the cycle bell by putting your palm on it and ring the bell, sound becomes fainter because: *[Application based]*

1. frequency becomes less.
2. amplitude becomes less.
3. number of vibrations becomes less.
4. None of the above.
5. Don't know the answer.

7. Below are feet of birds. Which of these is likely to be that of a water bird? *[Knowledge based]*

1. **2.** **3.** **4.** **5.** Don't know the answer

8. How you can control mosquitoes in your surrounding using the knowledge of ecology?

[Application based]

1. Increase the predators of mosquito.
2. Increase the predators of mosquito larva.
3. Avoiding ecological situations promoting growth of mosquito larvae.
4. All the above.
5. Don't know the answer.

9. You would have noticed that some aged people like your grandma or grandpa do not take salt in their food? Can you think why? *[Application based]*

1. Salt lowers the blood pressure.
2. Grandma does not like salt taste.
3. Salt increases blood pressure.
4. Salt is not available in the market.
5. Don't know the answer.

10. You get a stirred mixture of oil, sand and water in a glass. In which order from top to down they will settle down once the mixture stabilizes? *[Application based]*

1. Oil, water, sand,
2. Sand, oil, water
3. Water, sand, oil
4. Water, oil, sand
5. Don't know the answer

11. When you increase or decrease the number of proton in the nucleus of an atom, what happens? *[Reasoning based]*

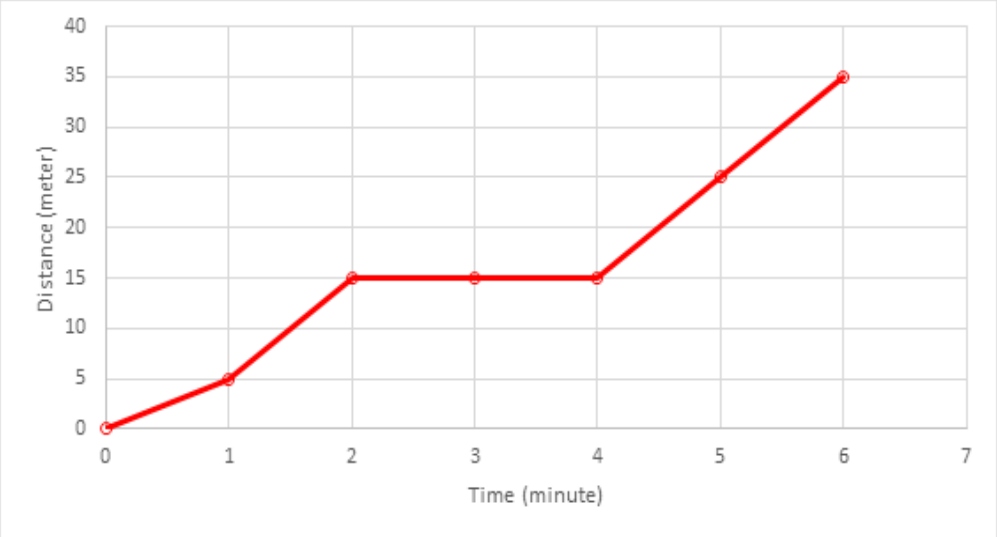
1. The element remains the same but it gets positively charged.
2. We get a new element.
3. We need to add more electrons to balance its charge.
4. All the above statements are wrong.
5. Don't know the answer

12. Three students measured the length of a table using a 6 inch scale in the pencil-box . Their

measurements come out to be 95.3 cm, 95.6 cm and 96 cm. Please see the statements below and tick the most appropriate answer. *[Reasoning based]*

1. They did not carry out the measurement correctly.
2. The problem was definitely with the scale.
3. Since variation is inevitable in measurement, it is ok to have this variation in their measurement.
4. The length of the table cannot be precisely determined from this data.
5. Don't know the answer.

13. Look at the graph given below and tell between which time interval the train was not moving: *[Application based]*



1. Between 0th and 2nd minute
2. Between 2nd and 4th minute
3. Between 4th and 6th minute
4. The train was constantly moving. It did not stop anywhere.
5. Don't know the answer

14. What can cause vibrations: *[Reasoning based]*

1. Blowing
2. Plucking
3. Hitting
4. All the above
5. Don't know the answer

15. Planets which are closer to the Sun take more time to complete one revolution than the planets

which are farther away from the Sun. *[Application based]*

1. True
2. False
3. Don't know the answer

Section C: Mathematics

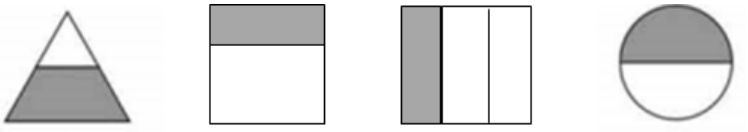
1. Which number is equal to $\frac{3}{5}$? *[Knowledge based]*

1. 0.8
2. 0.6
3. 0.53
4. 0.35
5. Don't know the answer

2. 3 + 8 = ☐+ 6 *[Application based]*
What number goes in the box to make this number sentence true?

1. 17
2. 11
3. 7
4. 5
5. Don't know the answer

3. Which figure is $\frac{1}{2}$ shaded? *[Knowledge based]*



1 **2** **3** **4**

Don't know the answer
5

4. A shirt that costs Rs.200/- is available at a price of Rs.160/- in a sale. What is the discount on the shirt? *[Application based]*

1. 20%
2. 40%
3. 60%
4. 80%
5. Don't know the answer

5. Which of these expressions is equivalent to y^3? *[Knowledge based]*

1. $y + y + y$
2. $y \times y \times y$
3. $3y$
4. $y^2 + y$
5. Don't know the answer

6. There were m boys and n girls in a parade. Each person carried 2 balloons. Which of these expressions represents the total number of balloons that were carried in the parade? *[Reasoning based]*

1. $2(m + n)$
2. $2 + (m + n)$
3. $2m + n$
4. $m + 2n$
5. Don't know the answer

7. A sequence of four figures is shown below. Observe the circles in each figure. If the figures were continued, how many circles would there be in Figure 10? (Do not draw the figures.) *[Reasoning based]*

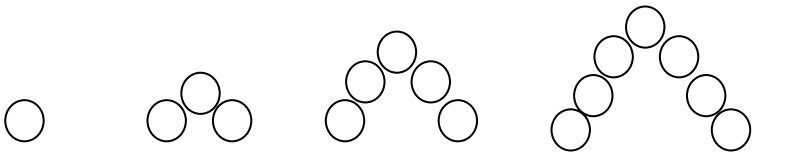


Figure 1 Figure 2 Figure 3 Figure 4

1. 10
2. 13
3. 19
4. 20
5. Don't know the answer

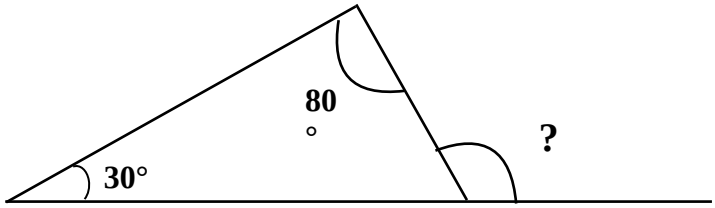
8. If t is a number between 6 and 9, then $(t + 5)$ is between which two numbers? *[Reasoning based]*

1. 1 and 4
2. 10 and 13
3. 11 and 14
4. 30 and 45
5. Don't know the answer

9. A class has 35 students in the classroom. If there are 15 girls in this class, then what is the ratio of girls to boys? *[Application based]*

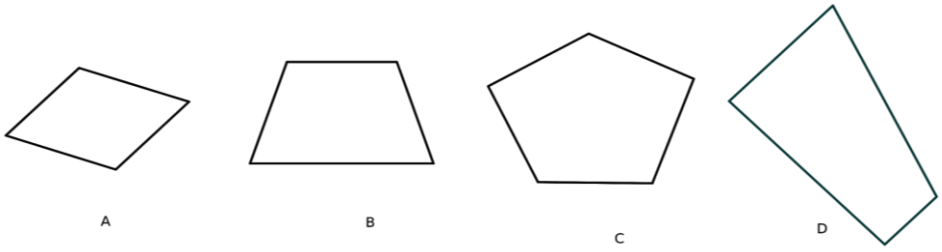
1. 3:7
2. 4:3
3. 4:7
4. 3:4
5. Don't know the answer

10. In the following figure, what will be the measure of the angle marked '?' *[Application based]*



1. 30°
2. 80°
3. 70°
4. 110°
5. Don't know the answer

11. Which of the following shapes has a right angle? *[Knowledge based]*

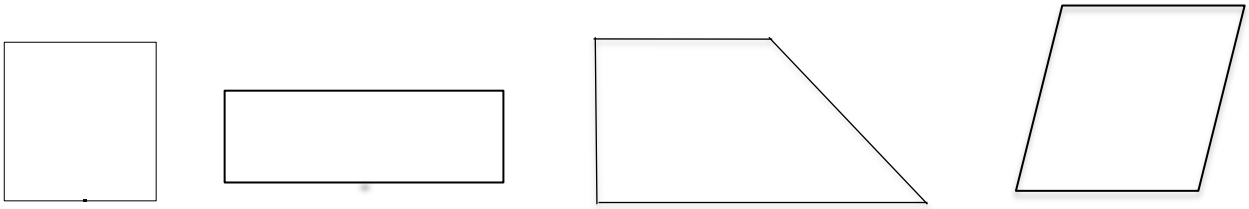


1. A

2. B
3. C
4. D
5. Don't know the answer

12. A shape has the following properties:
Two pairs of opposite sides are parallel; No right angle

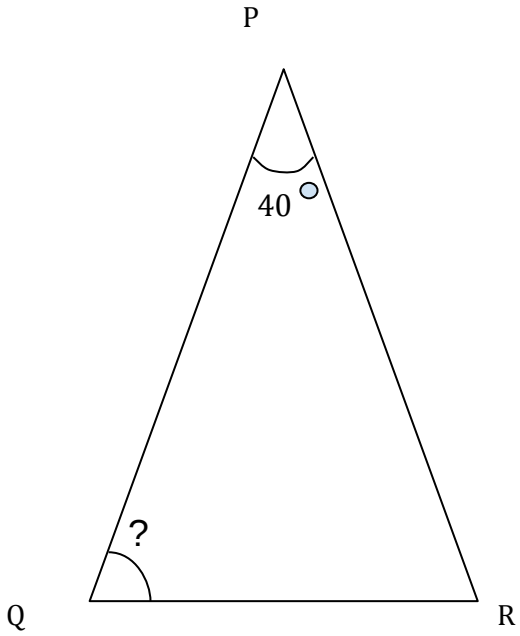
Which of the following shapes it can be? *[Reasoning based]*



P Q R S

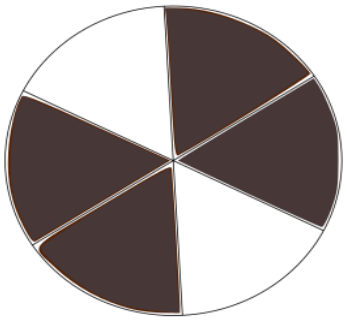
1. P
2. Q
3. R
4. S
5. Don't know the answer

13. PQR is an isosceles triangle. What is the measure of angle Q? *[Application based]*



1. 40^0
2. 70^0
3. 140^0
4. 180^0
5. Don't know the answer

14. Which of the following is equivalent of the fraction represented by the shaded part in the figure? *[Knowledge based]*



1. 2/3
2. 2/4
3. 1/6
4. 1/3
5. Don't know the answer

15. A car is moving at the speed of 60 kilometers per hour. How much distance will it cover in 1 and a half hour (1.5 hour)? *[Reasoning based]*

1. 1.5 kilometer
2. 30 kilometers
3. 60 kilometers
4. 90 kilometers
5. Don't know the answer

B. English Listening & Speaking Assessment tool

B.1 Speaking Task

Personal Interview Question

Listen to the questions and answer in complete sentences.

Q1) What is your name?

Q2) Please spell your name.

Q3) How old are you?

Q4) Name any two things you like about your school.

Q5) What TV programs do you like?

Naming Things and Describing Actions

Q6) Look at the picture. Name any five things in the picture.

Q7) Look again at the same picture. Now, describe any two actions in the picture.

Task 3

Narrating a story

Q8) This is a storybook cover. Guess what the story is and speak about it in a few sentences.

B.2 Listening Comprehension

Listen carefully to the conversations and answer the questions

Conversation 1:

Sangeeta saw a snake in the park near Susy's house.

1) Where was the snake?

(a) Near the park
(b) In Susy's house
(c) In the park
(d) Near Sangeeta's house

Conversation 2:

V1: Guddu, look what I found on my way to school this morning!
V2: Is that a 1000 rupee note?

V1: No! It is a 100 rupee note. It was lying near the coconut tree.
V2: I wonder who dropped it.
V1: I also found this at the same spot.
V2: Oh! That is a huge paint brush! Looks like the one I've seen with the village painter. Did you find a can of paint too?
V1: No, I didn't. I just saw a few spots of paint on the ground. Perhaps the brush fell off the painter's cycle.
V2: Poor man! Let's go find him and return his money and paint brush.

2) What did the girl find on her way to school?

(a) A coconut tree, a 1000 rupee note and a cycle
(b) A 100 rupee note and a paint brush
(c) A 100 rupee note, a can of paint and a paintbrush
(d) A 1000 rupee note, a cycle, a paint brush and a can of paint

Conversation 3:
V1: Excuse me! I have to go to the Model Govt. High School. I am late for an interview. Could you please give me directions?
V2: Certainly. Keep walking along this street, you will come to a big junction. Take a right at the junction.
V1: Take a right..okay...
V2: Keep walking along that road. When you see a huge banyan tree on your left, stop. You'll see the school on the opposite side.

3) What was the conversion about?

(a) going for an interview
(b) introducing oneself
(c) visiting a new place
(d) giving directions

4) Where was the banyan tree?

(a) To the school's right.
(b) To the school's left.
(c) Across the school.
(d) Next to the school.

5) The woman who gave directions was-

(a) helpful
(b) cheerful
(c) careful
(d) grateful

5. TEACHERS SURVEY

5.1. Demographics

The average age of teachers in the state was 40.57 for treatment and 41.09 for control schools. The percentage of male teachers in the control was higher (67) as compared to treatment (59). The percentage of OBCs were higher in treatment (38) compared to control (29).

Table 5.1: Demographics of teachers

Demographics	Treatment	Control
Average age	47.3	44.6
Male %	68	64
Female %	32	36
ST %	84.09	91
SC %	4.55	0
OBC %	4.55	9
General %	6.82	0
Other %	0	0

B.Ed. was the highest professional qualification for 95.45% teachers in the treatment schools and 90.91% teachers in the control.

Table 5.2: Professional Qualification of teachers

Highest	Treatment	Control
M.Ed	4.55	9.09
B.Ed	95.45	90.91
D.Ed	0	0
Other	0	0
None	0	0

5.2. Access to and use of technology

Teachers in control and treatment schools varied little in terms of their access to devices and technology such as mobile phones, internet and computers. Their scores were very similar with the treatment school teachers having a slight advantage (Table 5.3).

Table 5.3: Teachers' access to technology

Access to technology	Treatment (%)	Control (%)
Teachers with Mobile phone	100	100
Teachers with internet access	96	100
Teachers with computer/laptop	78	100
Total	44	11
Overall score	2.73	3

Teachers in the treatment school and control school reported very similar access to technology in their schools (Table 3.8 & 3.7). In terms of use of the technology in their schools too there was very little difference between the two groups (Table 5.4)

Table 5.4: Teachers' usage of technology devices

Usage of Technology Devices:	Total/Raw Score range	Treatment				Control			
		Mean	SD	Min	Max	Mean	SD	Min	Max
Access to Technology in school	**0-11**	2.7	1	1.0	3.0	3.0	0	3.0	3.0
Use of technology in school	**0-44**	3.2	2	0.0	8.0	3.5	1	1.0	6.0

Teachers' responses to use of digital technology in their everyday life were computed as scores which were very similar for the treatment and control school teachers. The mean scores of teachers in both treatment and control with regard to digital citizenship were 18.8 and 17.2 respectively. With regard to their beliefs about the use of technology, their mean scores for treatment and control were 14.8 and 14.5 respectively (Table 5.5).

Table 5.5: Teachers' scores on various aspects related to technology

Items	Factors	Raw score/Range	Treatment				Control			
			Mean	SD	Min	Max	Mean	SD	Min	Max
Digital citizenship	NA	10-30	18.8	4	13.0	29.0	17.2	4	12.0	23.0
Beliefs about use of Technology	F1= items 3, 11, 12, 15,16	**5-20**	14.8	1	13.0	20.0	14.5	1	14.0	15.0

	F2=items 1, 4,6,7	**4-16**	12.4	1	9.0	15.0	12.6	1	12.0	14.0
Challenges in Integrating Technology	F1= items 7, 8, 9, 10, 11 , 12, 13	**7-35**	26.4	5	15.0	35.0	26.0	4	19.0	33.0
	F2= items 4, 5, 6	**3-15**	11.4	2	6.0	15.0	11.5	3	6.0	15.0
	F3=items 1, 2, 3	**3-15**	12.4	2	7.0	15.0	12.9	2	10.0	15.0
Self-financed/ Informal training in computer	NA	-	0.9	1	0.0	5.0	2.0	2	0.0	5.0

Table 5.6: Teachers' digital activities in past three months

In the past three months, how often have you done the following activities?	**Never or almost never (%)**		**Several times (%)**		**Once in a week (%)**		**Almost every day (%)**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Browsed/ searched the internet for personal use	9	9	41	64	11	9	39	18
Browsed/ searched the internet to collect teaching materials to prepare lessons	23	9	52	64	16	18	9	9
Use powerpoint /slides for presenting in conference/district meeting/other	73	82	16	9	7	0	5	9
Created digital learning materials for students	66	82	18	18	16	0	0	0
Searched for courses/ activities for professional development	43	45	43	45	11	0	2	9
Interacted with online teachers' communities (including whatsapp groups)	20	55	52	27	11	18	16	0
Documented your class-work using video/audio	77	82	11	9	9	9	2	0
Attended EduSat classes	84	100	7	0	9	0	0	0
Used Smart-boards	86	100	9	0	2	0	2	0
Taken clippings on mobile phone for showing it to students in classrooms	59	55	27	45	11	0	2	0
Participated in an online course	82	100	16	0	2	0	0	0
Participated in COP discussions (Telegram)	77	82	18	18	5	0	0	0

In terms of frequency of usage of a digital device for classroom teaching, 36% teachers in the control schools had never used computers or laptops as compared to 41% of teachers in the treatment schools. 25% of teachers in treatment schools had used computers for teaching several

times a month or more frequently while 18% of teachers in the control group reported the same (Table 5.7).

Table 5.7: Teachers' usage of technology devices in school

	No, we do not have this		We have it, used before, but now it is not in working condition		We have it, but we never or almost never use it		Several times a month		At least once a week		Every day or almost every day	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**
LCD Projector	50	45	18	0	27	36	2	18	2	0	0	0
TV	18	36	23	9	30	36	11	9	7	0	11	9
Digital Camera	70	36	9	0	18	55	0	9	0	0	2	0
Overhead Projector	77	64	7	9	9	27	7	0	0	0	0	0
CD/DVD Player	84	73	5	0	9	27	2	0	0	0	0	0
Radio	91	91	5	0	2	9	2	0	0	0	0	0
Satellite Classrooms	91	100	2	0	7	0	0	0	0	0	0	0
Computer/Laptops	5	0	18	9	41	36	25	18	11	9	0	27
Smart Boards	89	100	0	0	5	0	5	0	0	0	2	0
Mobile phone	41	73	2	0	20	9	7	9	0	0	30	9
Tablet	95	100	0	0	0	0	2	0	0	0	2	0

With regards to specific digital activities on computers / smartphones, higher percentage of teachers in the treatment schools have reported using applications such as word (57 / 45), spreadsheets (32 / 36), mindmaps (16/0) email (50 / 64). Compared to control school teachers, higher percentages of treatment school teachers had done online activities such as bookings (29 / 0), using hyperlinks (30 / 9), downloading and uploading files (66 / 55), downloading & using apps on the mobile phone (68/55) (Table 5.8).

Table 5.8: Teachers' activities on computer/phone

Which of the following activities have you done with computer/phone in the past 3 months:	Have done it without any difficulty on my own, without any help		Have done it on my own with some difficulty, but without any help		Have done it, taking some help from others		Have done it with difficulty, with lot of help		Have never done it on my own or with help from others	
	T	C	T	C	T	C	T	C	T	C
Started a Computer	57	45	14	18	16	27	9	9	5	0
Typed in English on computer	66	64	14	18	16	18	2	0	2	0
Handled Mouse	75	55	14	27	5	18	5	0	2	0
Saved Files	61	64	18	18	16	18	2	0	2	0
Used Word/Notepad files	57	45	11	45	16	0	5	0	11	9
Used a spreadsheet	32	36	18	18	11	9	25	9	14	27
Used power point	20	27	11	18	20	18	16	18	32	18
Used Inkscape/ Paintbrush	20	9	11	9	14	18	27	0	27	64
Typed in Hindi/Mizo/Telugu	68	73	11	9	7	9	9	9	5	0
Used Internet browser (eg. Google Chrome	68	64	16	18	11	18	2	0	2	0
Used E-mail	50	64	7	0	27	0	9	36	7	0
Played computer games	50	55	23	9	9	27	5	0	14	9
Used Hyperlinks# (links from one site to	30	9	5	18	14	27	9	18	43	27
Downloaded/uploaded files (including on	66	55	14	18	9	9	0	18	11	0
Recorded audio/video on phone/camera	80	64	11	18	5	9	0	9	5	0
Clicked pictures with digital camera	80	45	2	18	0	27	0	0	18	9
Programmed a task	16	9	11	9	20	18	5	0	48	64
Used simulation	7	9	11	9	11	9	7	0	64	73
Used online maps	30	18	20	9	5	9	7	9	39	55
Booked ticket online	20	18	11	9	9	27	2	9	57	36
Downloaded & used apps on the mobile	68	55	11	9	9	9	2	27	9	0
Used video conferencing tool like	18	9	5	0	2	9	5	0	70	82
Used online course platform - TISSx	9	0	5	0	11	9	16	0	59	91
Used mindmap	16	0	2	0	11	0	14	0	57	100

5.3. Use of technology- Beliefs and challenges

This section explores beliefs reported by teachers with regard to use of technology in a teaching learning context. Teachers' beliefs about technology with respect to student learning were similar across treatment and control groups in several cases. Both groups disagreed that computers make students lazy (T-93 % / C- 73%). Similarly, both groups agreed that integrating technology improves classroom instruction (T-97 / C-100%) and that collaboration with peers and experts makes their instruction most effective (T-98% / C-100%). With regard to other beliefs teachers' beliefs varied across the two groups. A higher percentage of teachers in the control groups agreed that students are able to create better projects using computers (T-84% / C-91%), and also that students grasp difficult topics better with the use of computers (T-89% / C-91%). Disagreement on these belief statements was lower among the treatment school teachers. Some of the statements that are based on practical experience with implementing ICT based lessons, it is found that higher percentage of teachers in the treatment schools agree that doing group work can be time consuming, but is worth the time spent (T-82%/ C-18%). Control school teachers disagree that ICT is not useful in applying concepts in textbook to real life (T-47% / C-73%) (Table 5.9).

Table 5.9: Teachers' beliefs on technology and student learning

Beliefs About Technology	**S.Agree**		**Agree**		**Disagree**		**S.Disagree**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Integrating technology in teaching can improve students' learning	30	36	70	55	0	9	0	0
Computers make students lazy	2	0	27	27	59	73	11	0
Computers help students grasp difficult curricular concepts	5	0	84	91	11	9	0	0
Integrating technology in teaching will improve classroom instructions.	20	36	77	64	2	0	0	0
Instruction is most effective when teachers collaborate with other teachers or experts	30	18	68	82	0	0	2	0
Students create better projects with computers than with other traditional material.	11	9	73	82	14	9	2	0
Integrating technology in teaching will increase collaboration among students	9	0	89	100	2	0	0	0
Students working in groups is very time consuming	5	0	50	18	41	82	5	0

Students working in groups is often not very useful	0	0	18	9	80	82	2	9
Beliefs About Technology	**S.Agree**		**Agree**		**Disagree**		**S.Disagree**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Student learning during group work is worth the extra time that it takes	0	0	82	18	18	82	0	0
Students interact with each other more while working with computers	5	0	77	91	18	9	0	0
Integrating technology might increase healthy competition among students	14	0	77	18	9	82	0	0
Integrating technology in teaching in schools will satisfy parents' interest	11	91	75	9	11	0	2	0
Students' writing quality is worse when they use computers to type.	9	0	50	36	34	64	7	0
Using technology like internet, digital cameras, computer applications can help students apply and practically relate to concepts they learn in textbook	9	18	89	82	2	0	0	0
Some of the computer applications allow doing the tasks again and again which reduces the fear of failure among students	7	9	77	55	16	36	0	0
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	5	0	48	27	45	73	2	0

With respect to challenges in integrating technology for teaching learning, higher percentage of treatment teachers agreed that not having enough training for teachers to use computers (T-50% / C-36%), not having computer teachers (T-52% / C-36%), Not enough computers in the Computer Lab (T-37% / C-55%), internet too slow (T-41% / C-55%). (Table 5.10)

Table 5.10: Challenges in Integrating Technology in Teaching

Challenges in Integrating Technology in Teaching	**Extremely challenging**		**To some extent challenging**		**Not sure whether it is really a challenge**		**Not a challenge**		**Not a challenge at all, rather it is an opportunity to convert the scenario**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Not enough computers in the Computer Lab	37	55	39	36	11	9	13	0	0	0
Not enough training for teachers to use Computers	50	36	41	55	5	9	2	0	2	0

Not enough opportunity to practice Computers in curriculum	39	27	45	64	7	9	5	0	5	0
Challenges in Integrating Technology in Teaching	**Extremely challenging**		**To some extent challenging**		**Not sure whether it is really a challenge**		**Not a challenge**		**Not a challenge at all, rather it is an opportunity to convert the scenario**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Unstable/ intermittent power supply.	32	36	34	36	16	9	18	18	0	0
Frequent crashing of computers or outdated computers	20	18	43	36	11	18	23	27	2	0
Internet is too slow	41	55	41	27	2	0	16	18	0	0
Too many students in the class (difficult to give individual attention to students)	30	18	41	55	5	9	23	18	2	0
Don't know how to use computers for subjects I teach	27	27	34	36	7	0	30	18	2	18
Leadership is not supportive	7	9	39	55	27	0	25	36	2	0
Students are at different levels	27	55	52	36	14	9	7	0	0	0
Computer teacher is not available	52	36	20	45	14	9	14	9	0	0
Use of technology will take time away from completion of syllabus	41	0	43	55	5	18	11	27	0	0
Use of technology will make it difficult to manage students in the class as they have difficulties with operation of a computer	41	9	43	73	5	0	11	18	0	0

The factors that influenced the treatment school teachers to a large extent in use of technology in their teaching was the training and workshop (57%), enthusiasm of students (48%) followed by availability of working computers (45%) and access to experienced persons (41%). The factors that influenced the control group were on the other hand seeing other teachers using it in their classes (55%), resource support and mentoring (45%) followed by 36% teachers thinking of training and enthusiasm of students as most influencing. (Table 5.11)

Table 5.11: Influence upon decision to use technology in teaching

Influence upon decision to use technology in teaching	Influenced to a large extent		Influenced to some extent		Not influenced at all		Not applicable	
	T	C	T	C	T	C	T	C
Seeing other teachers using it in their classes	23	55	55	36	11	9	11	0
Other teachers sharing examples of how they have used technology	36	18	50	64	7	18	7	0
Resource support & mentoring	25	45	57	45	7	9	11	0
Availability of working computers to apply my knowledge.	45	18	43	82	9	0	2	0
Training/workshop	57	36	32	55	7	9	5	0
Enthusiasm and interest of students.	48	27	41	73	7	0	5	0
Access to experienced teachers or other experts.	41	27	45	64	11	9	2	0
Availability of a reliable support system.	32	27	52	45	9	9	7	18
Working lab with relevant resources.	30	27	57	45	9	27	5	0
Enthusiasm and interest of parents.	14	36	59	64	14	0	14	0

5.4 PEDAGOGY AND TECHNOLOGY

In terms of factors that will influence their abilities to integrate technology, the ranking given by both treatment and control groups was same. ‘Receiving training in technology-based teaching’ was ranked highest by both the treatment and control school teachers followed by ‘time to practice and plan’. (Table 5.12)

Table 5.12: Influencing factors for ability to integrate technology into education

Which of the following will make the most difference in your ability to integrate technology	T	C
Having a computer in school meant for teachers	150	47
Having a computer at home	133	37
Time to practice and plan	137	33
Receiving training in using computer	152	33
Receiving training in technology-based teaching	158	41
It is difficult to improve one's ability at this stage	189	30

Teachers' levels of preparedness across domains in control schools for Science was lower (56%) compared to the treatment school teachers (73%). This score was also slightly higher for Math teachers from treatment schools (51%) compared to control schools (48%). With respect to participation in TPD workshops, teachers in treatment schools scored higher as compared to their counterparts in control school, i.e., 39% in treatment and 33% in control for Science teachers; 43% in treatment and 25% in control for English teachers. In terms of use of computers, the scores of Math teachers were much lower (T-35% / C-0%) and those of English teachers were higher (T-68% / C-25%). (Table 5.13).

Table 5.13: Teachers' scores with respect to TPD and related aspects

Items	Domain		Treatment		Control	
		Total/ Raw Score range	Scores%	SD	Scores%	SD
Preparedness to teach the specific topics	Science	**12-36**	73	17	56	24
	Eng	11-33	77	10	73	13
	Maths	**7-21**	51	16	48	14
Participation in TPD workshops (other than CLIx)	Science	**0-7**	39	36	33	35
	Eng	0-6	43	42	25	50
	Maths	**0-7**	38	34	39	49
Use of computers in the last year for specific topics	Science	**0-11**	28	30	37	32
	Eng	0-5	68	30	25	30
	Maths		35	28	0	0
Need for specific topics as part of the TPD Course	Science	**0-4**	84	36	92	14
	Eng	0-4	95	14	94	13
	Maths		91	20	100	0

6. ENGLISH DOMAIN TEACHERS

With respect to beliefs on English teaching, 18 out of 19 (T: 14/15; C: 4/4) teachers[4] agreed that their teaching was about connecting textbook material with students' experience, helping them understand different kinds of communication. 18 of them were however also in agreement with some of the more traditional approaches such as focusing on grammar (Table 6.1a).
Most of the treatment school teachers said that they asked their students to relate what they are learning in English to their daily lives (T-10 out of 15, C-1 out of 4) and read their textbooks and other resource material (9) for almost every or half of the lessons. 1 control school teacher said that they asked their students to memorize rules and formulae and explain their answers for almost every or half of the lessons. As regards their actual teaching in the past year all teachers said they had students discuss in groups and relate to real life as well as memorize rules and facts for some lessons at least (Table 6.1b).

With regard to beliefs about student's learning in English, all 15 teachers from treatment schools and all 4 control school teachers said that students need exposure to more spoken English to improve. Almost all the treatment school teachers also believed that students who like reading are good at English and that they can learn on their own, if given guidance. All the control school teachers reported to agree with statements that students who find English difficult, do not try enough to learn and the teachers also felt the need to improve their English, so that they can teach it better (Table 6.2a).
English teachers reported frequent use of non-traditional approaches in language teaching such as watching English programmes (T-12) and encouraging students to come up with their own responses (T-13/C-2) (Table 6.2c).
Importantly, nearly all teachers reported using technology for all areas of English teaching, vocabulary (T-13/ C-1), conversation (T-10), listening (T-11/ C-1) and grammar (T-9 / C-2). (Table 6.3b).
11 teachers from treatment group and 3 control school teachers reported using computers to look up information sometimes or often. They also practiced reading and/or comprehension and learnt sentence construction (T-13/C-3). (Table 6.3c).

7. MATHS DOMAIN TEACHERS

Math teachers' responses with regard to subject pedagogy showed strong beliefs with respect to nontraditional practices. For example, all teachers in the treatment group agreed to the statements that math teaching was about reasoning and solving problems, connecting with students' experiences and trying out different types of problems. (Table 7.1a)

4 For English domain, the comparison with control group is not included as there was just one respondent in the control group.

Most of the treatment school teachers and control group teachers reported that they asked students to practice some of the math pedagogies like practicing adding, subtracting, multiplying, dividing without using calculator (T-8 out of 16, C-3 out of 4) and memorizing rules and formulae (T-7, C-2) for almost every or half of the lessons. (Table 7.1b)

With respect to certain persistent negative beliefs about Math learning, 14 out of 16 teachers in the treatment group disagreed with statements such as, geometry does not have any practical use for our students and math as a subject is not useful for all students and they should be allowed to opt not to study it. 3 out of 4 teachers in the control group disagreed with statements such as students who find math difficult do not have the ability to do mathematics and discussions in class disrupts discipline and distracts students. (Table 7.3c)

With regards to teaching using technology, 11 out of 16 treatment school teachers used technology for geometric reasoning, 5, 5 and 4 for proportional reasoning, linear equations and commercial mathematics respectively (all CLIx module topics). None of the teachers from the control group used computer to teach any of these 5 topics. (Table 7.3b).

During this academic year, 8 out of 9 teachers in the treatment schools said they sometimes (or often) used computers for math activities such as, solving problems, playing mathematics, learning new concepts, mathematical calculations, making geometric figures and watching instructional videos. None of the teachers from the control group had used computer for any of the activities. (Table 7.3c).

8. SCIENCE DOMAIN TEACHERS

With regard to characterizing of Science teaching, nearly all teachers in both treatment and control groups agreed with statements such as science is about thinking and reasoning, carrying out experiments and learning new technology. (Table 8.1a).

Most of the treatment school teachers and control group teachers reported that they asked students to practice some of the science pedagogies like observing and describing, watching demonstration of experiment or investigation, working together in small groups, using scientific formulae to solve routine problems to teach some of the lessons. 9 out of 14 teachers from treatment group and all the 3 control school teachers said they had students memorize facts and principles for every or almost every lesson. (Table 8.1b).

Teachers' own belief about learning science, showed positive beliefs with respect to perceived student ability, games, class discussions, gender and science teaching etc. Interestingly however, all teachers in control group and 7 out of 14 teachers from treatment group also agreed to the statement with regard to student mistakes. They believed that students mistakes must be corrected immediately (Table 8.2a).

In terms of specific practices, 9 out of 14 Science teachers from treatment group said they sometimes encouraged their students to come up with their own ideas to solve problems. 10 treatment school teachers and all the 3 control group teachers reported doing learning activities with students sometimes. (Table 8.2c).

In the case of use of technology in science teaching, motion and health and disease were the topics where 7 out of 14 teachers had used technology in the treatment group. Technology was not used to teach astronomy and magnetism by any of the control school teachers. (Table 8.3b)

In terms of using technology for their own teaching preparation, 9 teachers in the treatment group had used technology to look up ideas and information sometimes while 7 teachers had sometimes used technology for data analysis, video analysis, reading lessons and assessments. All control group teachers had worked with simulation and read lessons on computer sometimes. (Table 8.3c)

9. COMPARISON ACROSS DOMAINS

With regard to classroom teaching for English, 12 out of 15 teachers from treatment and all 4 control school teachers disagreed with statement that connecting students' learning with out of school contexts is not useful. Teachers are strapped for time which is reflected in their varied response to the statement on having less time to do additional activities (Table 6.2b). 13 out of 16 Maths teachers in the treatment group and 3 out of 4 teachers in the control group felt that when students make mistakes, the best remedy is to give them repeated practice of similar problems and they agreed that they suggest some simple questions for students poor in mathematics to help them pass in examination. However, both the groups disagreed that connecting maths taught with out-of-school situations is not useful. (Table 7.2b). Similar to English and Math, most Science teachers (11 out of 14 treatment and all 3 control teachers) agreed that students should be given repeated practice if they make mistakes. Most of the teachers also believed that connecting maths taught with out-of-school situations is useful. Teachers from both the groups said that making students give personal opinions about the content is useful.

On use of technology for English teaching, 12 out of 15 teachers from treatment schools felt that their students were more confident of speaking in English after the CLIx classes (Table 6.3a). 14 out of 16 Math teachers from treatment schools agreed that children are more interested in solving problems after CLIx class in Mathematics (Table 7.3a) and 10 out of 14 Science teachers felt that their students ask more questions after Science CLIx classes (Table 8.3a). Almost all the teachers from both groups across the 3 domains said that they do not mind of their students ask questions or interact during the lab classes.

With respect to challenges in using computers for teaching, most of the English teachers from treatment schools reported a lot or some challenges with respect to shortage of computer hardware and computer software, shortage of support for using computers and lack of audio-visual aids. In the control group teachers for both English and Maths, shortage of equipment for use in demonstrations and other exercises and shortage of support for using computers were reported as challenges (Table 6.4a). Maths teachers from treatment schools also reported the same challenges as English teachers in addition to inadequate physical infrastructure (Table 7.4a). As far as integration of technology is concerned, 4 out of 14 Science teachers from treatment schools regarded shortage of computer hardware as 'a lot challenging' as compared to 2 out of 3 control group teachers who reported inadequate physical facilities as lot challenging. Large class size was seen as 'not at all challenging' by half of the treatment school teachers and all of the control group teachers. (Table 8.4a).

Teachers in the treatment schools perceived uninterested students (English -13 out of 15, Math-10 out of 16), students with different academic abilities (English-10, Math-9) and students' diverse backgrounds (English-12, Math-9) as being 'a lot' challenging to their teaching learning. The control group teachers from both domains also thought of these as the main challenges (Table 6.4b and 7.4b). Science teachers (5 out of 14) said that students coming from diverse backgrounds were a factor that was 'a lot limiting'. Students with special needs were reported as not at all limiting by 3 treatment school teachers and 2 out of 3 control school teachers (Table 8.4b).

With respect to their own preparedness, English teachers reported being relatively less prepared on areas pertaining to communication and language teaching (Table 6.5). Majority of Math teachers from treatment schools reported being 'very well prepared' to teach simple linear equations and inequalities, and simultaneous (two variables) equations and geometric properties of angles and geometric shapes. 10 teachers from treatment schools said they were somewhat prepared to teach Relationship between three–dimensional shapes and their two-dimensional representation and Cartesian plane-ordered pairs, equations, intercepts, intersections, and gradient Translation, reflection, and rotation'. The responses for control school teachers were similar to that of treatment group teachers (Table 7.5). Science teachers' level of preparedness (Tables 8.5 a,b,c) as reported for biology, chemistry and physics showed treatment school teachers feeling overall less prepared on topic of variation and adaptation in Biology (10 out of 14) followed by matter in Chemistry (9 out of 14) and physics topic of forces and motion (8 out of 14). For the 3 control school teachers, response is distributed so it was not reported here.

Barring observations of a peer teachers' classroom or observation of one's own classes by other teachers, most English teachers from both treatment and control reported having done activities such as discussions and interactions in their school or on the online communities of practice or both (Table 6.6). In addition to the two activities mentioned for English teachers, more than half of the math teachers from treatment schools did not have discussions about how to use technology in the class in school or on Telegram. Almost all control school teachers had interactions about every area given in table 6.6. Again similar to English and Math, only less than half of the Science teachers from treatment schools did observations of other teachers' classes, had their own classes observed or had discussions on how to teach a particular concept. Most of the teachers had interaction about children's learning and experience, clarifying doubts (also for all control teachers) and working on preparing lesson plans (Table 8.6).

Half of the English teachers had received training in curricular content, pedagogy and improving students' critical thinking or problem solving skills. Only 1 out of 4 control school teachers had received training in all the given areas (Table 6.7a). 8 out of 16 English teachers in the treatment schools reported a strongly perceived need for training in technology integration while control school teachers felt need for this as well as pedagogical tools and techniques (Table 6.7b). All the teachers from treatment schools preferred Computer based training sessions, although almost all teachers from both groups preferred all the modes of TPD (Table 6.7c). Most of the Math teachers from both groups had received training in math content, pedagogy and improving students' critical thinking or problem solving skills (Table 7.7a). 10 out of 15 Math teachers from treatment group said they need some training in subject understanding and pedagogical tools and techniques. All the 4 teachers from control group reported that they need some training in all the 4 areas given in table 6.7b. Teachers in both groups expressed preference for all modes of TPD training, from face to face interactions through hand-on activities. (Table 7.7c). As regards TPD for Science, 9 out of 14 treatment school teachers and 1 out of 3 control group teachers reported receiving training in science content. 2 teachers from control group had not received training in any of the areas given in table 8.7a. 6 out of 14 teachers in treatment group said they strongly feel the need to get training in the subject integration of technology. 10 out of 14 Science teachers in the treatment group and all the 3 control school teachers said they need some training in pedagogical tools and techniques. Interestingly, none of the teachers from control group perceived a strong need to receive training in any of the given areas (Table 8.7b). Almost all teachers from both treatment and control groups preferred all the modes of TPD given in table 8.7c.

The following tables shows the areas in which majority of teachers from all the three domains in both treatment and control groups feel very well prepared to teach:

Table 9.1: Teacher preparedness

Domain	Treatment	Control
English	Note taking, Grammatical correctness, Describing / narrating / reporting, Comprehension	Note taking and polite expressions
Maths	Simple linear equations and inequalities and simultaneous; Geometric properties of angles and geometric shapes	Same as treatment
Science	Biology: Trends in human population and its effects on the environment; Interaction of living organisms and the physical environment in an ecosystem Physics: Basic properties/behaviors of light and sound; Forces and motion; Chemistry: Classification and composition of matter; Chemical change	Not reported as responses are distributed for the 3 control school teachers

10. Key findings (Teachers)

This report gives the status of teachers with respect to their access to technology, its usage in teaching, their beliefs regarding integration of technology in education and their overall subject preparedness based on a survey conducted in 26 schools: 20 treatment and 6 control in Mizoram.

Access and usage of technology: It was found that almost all the teachers from both treatment and control schools have mobile phones with internet access.

With regard to their use of technology for teaching-learning activities in the 3 months before survey, 64% of teachers from control schools browsed/ searched the internet for personal use as well as for collecting teaching materials to prepare lessons several times whereas 52% of teachers from treatment schools interacted with online teachers' communities and browsed/ searched the internet for collecting teaching materials to prepare lessons several times.

100% of the control school teachers and more than 80% of treatment school teachers never attended EduSat classes, never used smart-boards and never participated in any online courses.

Activities on digital devices: Data on teachers' digital activities on computers/smartphones shows that 68% of the treatment school teachers and 73% of control school teachers said they were able to type in Mizo without any help while equal percentage of the former group and 64% of control school teachers reported using internet browsers without any difficulty.

57% of treatment school teachers and 45% control school teachers said they could use Word/notepad while only around 30% and 20% of teachers from both groups could use spreadsheet and PowerPoint respectively.

Pedagogical practices: Teachers were asked to give their opinion on statements connected to their practices in the classroom. Majority of English (10 out of 15) and Math teachers (14 out of 16) from treatment schools and 2 out of 3 Science teachers in control schools agreed that did not have time to do additional activities because they need to complete syllabus.

Pedagogic pillars: In accordance with the 3 pedagogic pillars of CLIx, i.e. peer discussion, learning from mistakes and relevance, teachers were asked their views on related statements. 13 out of 15 English teachers from treatment group and 3 out of 4 control school teachers reported doing activities involving group work for students. 12 out of 16 Math treatment teachers and all 4 control school teachers reported that they also encouraged group activities.

All 14 Science teachers from treatment group and 1 out of 3 control school teachers said they sometimes or frequently did activities that involved group work that allow students to see, share and discuss their class work solutions with each other.

Almost all teachers from treatment schools across the 3 domains and all the control school teachers agreed that when students make mistakes, the best remedy is to give them repeated practice of similar problems. Interestingly, almost all teachers from both the groups across the 3 domains agreed that connecting the subjects with out-of-school contexts is useful.

Beliefs about use of technology: Teachers were also asked about their beliefs with regard to use of technology in a teaching learning context. 93% treatment and 73% control school teachers disagreed that computers make students lazy. Almost all teachers from both groups believed that integrating technology improves classroom instruction and that collaboration with peers and experts makes their instruction most effective.

Regarding their belief about technology's usefulness for students, 91% of teachers in the control group and more than 80% in treatment group agreed that students are able to create better projects using computers and also that students grasp difficult topics better with the use of computers. 82% of teachers in the treatment schools agreed that doing group work can be time consuming, but is worth the time spent.

Views about using technology in subject teaching: 12 out of 15 treatment school teachers and all 4 control school teachers agreed that children were more confident to speak after English CLIx classes. Almost all the Math teachers from both treatment and control groups agreed that children were more interested in solving problems after CLIx class in Mathematics. Similarly, majority of Science teachers from both the groups agreed that children ask more questions after Science CLIx classes.

All the teachers across all three domains from both the groups also disagreed with the statement that they do not like their students asking questions or interacting with each other during the Lab classes.

Challenges in integration of technology: Teachers' views about challenges for integration of technology in teaching shows that about 50% of treatment school teachers think that not having a computer teacher in school and lack of training to use computers are extremely challenging.

55 % control school teachers reported that not having enough computers in lab and students being at different levels were the most challenging factors for integration of technology in teaching.

Physical conditions as a challenge for teaching: With respect to challenges in using computers for teaching, most of the treatment school teachers in all the 3 domains reported a lot or some challenges with respect to shortage of computer hardware and computer software and shortage of support for using computers.

For the control group teachers, shortage of equipment for use in demonstrations and other exercises, shortage of support for using computers and inadequate physical infrastructure were reported as challenges.

Students as a challenge in teaching: Teachers in the treatment schools perceived uninterested students, students with different academic abilities and students' diverse backgrounds as being 'a lot' challenging to their teaching learning in all the 3 domains. The control group teachers also thought of these as the main challenges.

Preparedness, Participation in TPD, Use of computers: Teachers' levels of preparedness across domains in control schools for Science was lower (56%) compared to the treatment school teachers (73%). With respect to participation in TPD workshops, 43% teachers in treatment schools scored higher as compared to their counterparts in control school (25%) for English.

Majority of teachers across all the 3 domains expressed the need to include integration of technology in teaching as part of their TPD course.

With regard to the mode of TPD training, English teachers preferred Computer based training sessions, Math teachers reported that trainings should be in the form of interactions with other teachers (peer learning) and Science teachers chose hands-on activities as the preferred mode of training.

ANNEXURE 4

Table 6.1a: Beliefs about teaching English

Teaching of English is about:	Strongly agree		Agree		No opinion		Disagree		Strongly Disagree	
	T	C	T	C	T	C	T	C	T	C
Making students read aloud from the textbook.	4	1	8	3	0	0	3	0	0	0
Making students memorise the rules of grammar.	5	0	9	3	0	0	1	0	0	1
Teaching the content given in the textbook.	4	1	9	3	0	0	2	0	0	0
Connecting the textbook material with students' experience.	6	2	8	2	0	0	1	0	0	0
Making students listen to and speak English.	7	2	7	2	0	0	1	0	0	0
Focusing on literature.	2	1	12	3	0	0	1	0	0	0
Focusing on language use (Grammar, etc).	4	2	10	2	0	0	0	0	1	0
Making students repeatedly write out answers to questions in the textbook.	2	1	7	2	0	0	6	1	0	0
Helping students understand different types of communication.	5	0	9	4	0	0	1	0	0	0

Table 6.1b: English teacher's practices in classroom for students

During this academic session, while teaching English to the students in class 9, how often did you usually ask them to do the following?	Never		Some lessons		About half the lessons		Almost every lesson	
	T	C	T	C	T	C	T	C
Memorize rules and formulas (spellings, grammar rules, etc.)	0	1	8	2	0	0	7	1
Apply facts, concepts and rules to complete tasks (role play, letter writing,)	0	0	8	4	3	0	4	0
Explain their answers	0	0	7	3	1	0	7	1

During this academic session, while teaching English to the students in class 9, how often did you usually ask them to do the following?	Never		Some lessons		About half the lessons		Almost every lesson	
	T	C	T	C	T	C	T	C
Relate what they are learning in English lessons to their daily lives	0	0	5	3	4	0	6	1
Read their textbooks and other resource material.	0	0	6	4	2	0	7	0
Decide on their own procedures to complete tasks / answer questions.	1	0	8	4	1	0	5	0
Work on problems for which there is no immediately obvious method of solution	2	1	10	3	1	0	2	0
Work together in small groups	3	1	10	3	1	0	1	0
Find information and present to the class the next day. (Meanings, facts, etc.)	0	1	10	3	0	0	5	0

Table 6.2a. Beliefs about English learning

Beliefs about English learning	Strongly agree		Agree		No opinion		Disagree		Strongly Disagree	
	T	C	T	C	T	C	T	C	T	C
Students, who find English difficult, do not try enough to learn.	5	0	5	4	0	0	5	0	0	0
Students need exposure to more spoken English to improve.	9	2	6	2	0	0	0	0	0	0
Students' mother tongue should not be used in the English classroom.	3	0	5	0	0	0	7	4	0	0
Girls are better at using English than boys.	1	1	3	2	3	0	8	1	0	0
Games and activities are suitable for primary school, not for high school classes.	0	0	3	1	2	0	7	3	3	0
Discussions in class disrupt discipline and distract students.	0	0	3	0	0	0	12	4	0	0
Students can learn on their own, if given guidance.	2	1	11	2	0	1	2	0	0	0
My students can easily understand English films / TV Programmes.	2	0	7	1	1	1	5	2	0	0
Students should be corrected for mistakes they make, as soon as they make these mistakes.	2	0	7	3	5	0	1	1	0	0
Teaching English is difficult.	0	0	4	3	10	0	0	1	1	0
We should spend more time teaching subjects other than English.	0	0	6	0	2	1	6	3	1	0
I need to improve my English, so that I can teach it better.	5	0	7	4	1	0	1	0	1	0
Students who like reading are good at English.	4	0	10	3	0	1	1	0	0	0

Table 6.2b: Beliefs about classroom practices in English

English teaching in the classroom	Strongly agree		Agree		No opinion		Disagree		Strongly Disagree	
	T	C	T	C	T	C	T	C	T	C
I have no time to do additional activities, because I have to cover all the content in the textbook.	4	0	6	1	0	0	5	3	0	0
Making students give personal opinions about the text is not useful.	0	0	3	1	2	0	10	3	0	0
When students make mistakes, the best remedy is to give them repeated practice of similar problems	2	0	12	4	0	0	1	0	0	0
Films / Radio clippings are not necessary materials in the English class.	0	0	1	0	4	1	9	3	1	0
Students need to know only standard rules because alternative grammatical structures confuse them.	0	0	4	3	3	1	7	0	1	0
Connecting English with out-of-school contexts is not useful	0	0	1	0	2	0	11	4	1	0

Table 6.2c: Frequency of classroom practices in English

In the English classroom	Always		Frequently		Sometimes		Never	
	T	C	T	C	T	C	T	C
I discuss the answers and ask the students to write their own answers.	2	0	6	0	7	4	0	0
I organize learning activities (games, puzzles, role plays) with the students.	0	0	3	0	10	2	2	2
I do activities that involve group work that allow students to see, share and discuss their class work or home work with each other	2	0	4	0	9	3	0	1
I maintain silence/ discipline because students must concentrate and individually understand the English lesson / concept.	5	0	2	2	8	2	0	0

I encourage students to come up with their own ideas about how to answer questions.	8	0	5	2	2	2	0	0
I encourage students to watch news / TV programmes / films in English.	9	0	3	1	3	3	0	0
I use recent newspaper articles as teaching materials.	1	0	3	1	10	2	1	1

Table 6.3a: Views about using technology in English teaching

What are your views about using technology in your subject teaching?	**Strongly agree**		**Agree**		**Disagree**		**Strongly Disagree**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Slow Learners get left out in Lab sessions	0	0	5	1	8	3	2	0
Watching videos is more useful than interactives on computers.	1	0	4	1	10	3	0	0
Fear of committing mistakes increases with computer-aided learning	1	0	4	1	10	3	0	0
Computer-aided lessons should be optional only.	1	0	6	1	8	3	0	0
I do not like my students asking questions or interacting with each other during the Lab classes	0	0	0	0	12	4	3	0
Children are more confident to speak after English CLIx classes	2	0	10	4	3	0	0	0

Table 6.3b: Topics for which computer was used to teach in English

	Yes		**No**	
For which of the following topics, did you use computers in the last year?	**T**	**C**	**T**	**C**
Vocabulary	13	1	2	3
Conversation skills	10	0	5	4
Grammar	9	2	6	2
Listening skills	11	1	4	3

Letter Writing	8	1	7	3

Table 6.3c: Activities for which computer was used in teaching English

In this academic year, while teaching English to class 9, how often have you used a computer for the following activities?	**Never**		**Sometimes**		**Often**		**Always**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Look up ideas and information	3	1	8	2	3	1	1	0
Watch videos	5	4	9	0	1	0	0	0
Look up word meanings	1	1	8	2	3	1	3	0
Record their voices	7	4	7	0	1	0	0	0
Create stories	5	2	8	2	2	0	0	0
Learn Sentence construction	3	1	9	1	2	2	1	0
Practice reading and/or comprehension	1	1	10	2	3	1	1	0
Answering assessment questions.	1	3	12	1	2	0	0	0

Table 6.4a Challenging conditions that limit teaching (English)

Challenges in use of computers	**A lot**		**Some**		**A little**		**Not at all**		**Not applicable**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Shortage of computer hardware.	4	3	5	1	3	0	3	0	0	0
Shortage of computer software.	2	2	8	2	2	0	3	0	0	0
Shortage of support for using computers.	1	3	6	1	4	0	3	0	1	0
Shortage of textbooks for student use.	1	0	2	1	3	2	6	1	3	0
Shortage of other instructional equipment for students' use.	2	1	5	3	5	0	2	0	1	0
Shortage of equipment for your use in demonstrations and other exercises.	3	0	6	4	4	0	2	0	0	0
Inadequate physical facilities.	3	1	3	3	3	0	6	0	0	0
Large class size.	2	0	2	0	3	2	6	2	2	0
Lack of audio-visual aids.	5	1	4	2	3	1	2	0	1	0
Lack of support from peers and/or school administration.	1	0	3	2	2	2	8	0	1	0
Shortage of reference material (books, newspapers) in English.	3	0	3	3	4	1	5	0	0	0

Table 6.4b: Challenges with respect to students that limit teaching (English)

Challenges faced in teaching Math for class 9	A lot		Some		A little		Not at all		Not applicable	
	T	C	T	C	T	C	T	C	T	C
Students with different academic abilities	2	2	8	2	3	0	2	0	0	0
Students come from a wide range of backgrounds (example economic, language).	6	2	6	1	3	1	0	0	0	0
Students with special needs (e.g., hearing, vision, speech impairment, physical disabilities, mental or emotional/psychological impairment)	1	0	4	1	5	3	3	0	2	0
Uninterested students	6	1	7	1	1	2	1	0	0	0
Disruptive students	2	0	7	2	3	2	3	0	0	0

Table 6.5: Preparedness to teach English topics

How well prepared do you feel you are to teach the following topics?	**Not well prepared**		**Somewhat prepared**		**Very well prepared**		**Not applicable**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Comprehension	0	0	6	2	9	1	0	1
Note Taking	0	0	5	1	10	3	0	0
Practicing Social Conversation	1	0	11	4	3	0	0	0
Understanding and speaking for functional purposes (directions, instructions)	1	0	9	3	5	1	0	0
Describing / narrating / reporting	2	0	4	2	9	2	0	0
Debating / Presenting an argument	1	2	11	2	3	0	0	0
Grammatical correctness	1	0	4	2	10	2	0	0
Appropriate communication	2	0	10	4	3	0	0	0
Polite expressions	1	0	7	1	7	3	0	0
Literal and figurative speech	1	1	10	3	3	0	1	0
Literary language	1	0	10	3	4	1	0	0

Table 6.6: Types of interactions with other teachers (English)

Did you have the following types of interactions with other teachers either in your school or in your Telegram (COP) group?	In my School		In Telegram		Both in School and in Telegram		Neither in school nor in Telegram	
	T	C	T	C	T	C	T	C
Discussions about how to teach a particular concept	10	4	0	0	2	0	3	0
Working on preparing lesson plans	14	3	0	0	0	1	1	0
Visits to another teacher's classroom to observe his/her teaching	5	1	0	0	0	0	10	3
Informal observations of my classroom by another teacher	5	2	1	0	0	0	9	2
Discussions with other subject teachers to integrate English with other disciplines	11	4	0	0	0	0	4	0
Discussions with other teachers on children's learning and experience	11	4	2	0	1	0	1	0
Clarifying doubts about the subject	13	3	0	0	1	1	1	0
Sharing resources or teaching ideas	12	2	1	0	2	2	0	0
Asking or answering on how to use technology in the class	10	2	1	0	2	1	2	1
Sharing experiences	11	2	1	0	3	2	0	0

Table 6.7a: Participation in TPD during last year (English)

During the last year, have you participated in professional development training/workshops (other than CLIx) in the following?	Yes		No	
	T	C	T	C
English curricular content.	7	1	8	3
English pedagogy/instruction.	7	1	8	3
Integrating information technology into English Teaching.	6	1	9	3
Improving students' critical thinking or problem solving skills.	7	1	8	3
Methods of Assessment.	6	1	9	3
ICT Training	6	1	9	3

Table 6.7b: Topics of TPD needed by English teachers

How strongly do you feel the need to have the following included as part of the English Teacher Professional Development Course?	I strongly need training in this		I need some training in this		I don't need training in this	
	T	C	T	C	T	C
Subject understanding	7	0	7	3	1	1
Pedagogical tools and techniques	4	2	11	2	0	0
Integration of technology in teaching	8	2	7	2	0	0
Student Assessments	4	0	9	4	2	0

Table 6.7b: Topics of TPD needed by English teachers

I would like teacher professional development to be offered in the form of	Yes		No	
	T	C	T	C
Face to face lectures	13	4	2	0
Computer based training sessions	15	4	0	0
Interactions with other teachers (peer learning)	14	4	1	0
Referring to books, magazines	14	4	1	0
Hands-on activities for teachers	14	4	1	0

Table 7.1a: Beliefs about teaching Math

I feel that teaching Math is about:	Strongly agree		Agree		No opinion		Disagree		Strongly Disagree	
	T	C	T	C	T	C	T	C	T	C
Practicing lot of similar problems	4	0	8	2	0	0	4	2	0	0
Memorizing the rules and procedures	4	1	10	3	1	0	1	0	0	0
Completing the content given in the textbook	1	0	8	3	1	0	6	1	0	0
Trying out different types of problems	3	0	13	4	0	0	0	0	0	0
Connecting with students' experiences	4	0	12	4	0	0	0	0	0	0
Understanding connections between different Mathematical concepts	5	1	11	3	0	0	0	0	0	0
Arriving at correct answers.	2	1	11	3	2	0	1	0	0	0
Practicing calculations.	3	1	12	3	0	0	1	0	0	0
Learning to reason and solve problems.	7	1	9	3	0	0	0	0	0	0

Table 7.1b: Math teachers' practices in classroom for students

During this academic session, during teaching Mathematics to the students in the class 9, how often did you usually ask them to do the following?	Never		Some lessons		About half the lessons		Almost every lesson	
	T	C	T	C	T	C	T	C
Practice adding, subtracting, multiplying, and dividing without using a calculator	3	1	5	0	3	0	5	3
Work on fractions and decimals	0	0	12	2	1	0	3	2
Use knowledge of the properties of shapes, lines and angles to solve problems	0	0	11	2	0	1	5	1
Interpret data in tables, charts or graphs	3	0	8	4	2	0	3	0
Write equations and functions to represent relationships	0	0	10	3	2	0	4	1
Memorize formulas and procedures	0	0	9	2	1	1	6	1
Apply facts, concepts and procedures to solve routine problems	0	0	11	4	1	0	4	0
Explain their answers	0	0	9	3	0	0	7	1
Relate what they are learning in mathematics to their daily lives	0	0	9	4	2	0	5	0
Decide on their own procedures for solving complex problems	0	0	10	4	3	0	3	0
Work on problems for which there is no immediately obvious method of solution	3	1	12	3	1	0	0	0
Work together in small groups	9	1	7	3	0	0	0	0

Table 7.2a: Beliefs about Math learning

Beliefs about Maths learning	Strongly agree		Agree		No opinion		Disagree		Strongly Disagree	
	T	C	T	C	T	C	T	C	T	C
Students who find math difficult do not have the ability to do mathematics	0	0	2	1	2	0	8	3	4	0
Students who stick to the procedures told in class do well in maths	2	0	9	2	2	1	3	0	0	1
Geometry does not have any practical use for our students	0	0	1	0	1	0	9	4	5	0
Boys are better at doing mathematics than girls.	0	0	2	1	3	0	7	2	4	1
Games and activities are suitable for primary school maths, not for high school maths	1	0	4	1	2	0	7	2	2	1

Discussions in class disrupt discipline and distract students.	0	0	2	0	2	0	11	3	1	1
Beliefs about Maths learning	**Strongly agree**		**Agree**		**No opinion**		**Disagree**		**Strongly Disagree**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Students can come up with mathematical solutions on their own without being told the procedure to solve the problem first.	0	0	8	1	1	0	7	2	0	1
Students' mistakes should be corrected by teachers , as soon as they are made.	1	0	8	3	0	0	7	0	0	1
Teaching Mathematics is difficult.	1	0	1	1	0	0	9	2	5	1
Continuous comprehensive evaluation of students is not useful in improving students' learning.	2	0	1	2	6	0	7	2	0	0
Mathematics as a subject is not useful for all students and they should be allowed to opt not to study it.	2	0	0	2	0	0	9	2	5	0
I feel the need to refresh and deepen my knowledge of mathematics to improve my teaching.	6	0	9	4	1	0	0	0	0	0
Students need to engage in a lot of practice to learn mathematics.	9	1	6	2	1	0	0	1	0	0
Students should be allowed to use calculators to find solutions.	0	0	1	1	3	0	5	3	7	0

Table 7.2a: Beliefs about Math learning

In the Mathematics classroom that I teach	**Strongly agree**		**Agree**		**No opinion**		**Disagree**		**Strongly Disagree**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**
I have no time to do additional activities, because I have to cover all the content in the textbook.	1	0	8	1	2	0	5	3	0	0
Students need to know only the standard procedures because alternative procedures confuse them	0	0	2	1	3	0	11	3	0	0
Connecting maths taught with out-of-school situations is not useful.	0	0	1	1	1	0	13	3	1	0
When students make mistakes, the best remedy is to give them repeated practice of similar problems.	0	0	13	4	3	0	0	0	0	0
Only one concept is taught at a time because discussing many concepts together confuses students.	2	0	10	1	2	0	2	3	0	0
I suggest some simple questions for students poor in mathematics to help them pass in examination.	2	0	11	3	1	0	1	1	1	0

Table 7.2c: Frequency of classroom practices in Math

In the Mathematics classroom:	Always		Frequently		Sometimes		Never	
	T	C	T	C	T	C	T	C
I solve one/two problems on the board & ask students to solve the rest of the textbook exercises in their notebooks	0	0	2	1	4	1	10	2
I do learning activities (games, puzzles, materials) with students	0	0	3	0	10	3	3	1
I do activities that involve group work that allow students to see, share and discuss their class work/maths problem solutions with each other	0	0	2	0	10	4	4	0
I maintain silence/ discipline because students must concentrate and individually do maths	8	1	2	1	6	2	0	0
I encourage students to come up with their own ideas about how to solve problems.	6	1	6	2	4	1	0	0
I use teaching learning materials and aids like paper folding, charts etc.	2	0	4	0	9	4	1	0
I use Information and Communication Technology (ICT) for teaching mathematics.	0	0	1	0	7	2	8	2

Table 7.3a: Views about using technology in Math teaching

What are your views about using technology in your subject teaching?	Strongly agree		Agree		Disagree		Strongly Disagree	
	T	C	T	C	T	C	T	C
Slow Learners get left out in Lab sessions	1	0	3	0	12	4	0	0
Watching videos is more useful than interactives on computers.	0	0	6	2	8	2	2	0

Fear of committing mistakes increases with computer-aided learning	0	0	5	0	11	4	0	0
Computer-aided lessons should be optional only.	0	0	8	2	8	2	0	0
I do not like my students asking questions or interacting with each other	0	0	1	0	10	3	5	1
Children are more interested in solving problems after CLIx class in Mathematics.	0	0	14	3	2	0	0	1

Table 7.3b: Topics for which computer was used to teach in Math

For which of the following topics, did you use computers in the last year?	**Yes**		**No**	
	T	**C**	**T**	**C**
Algebra	3	0	13	4
Proportional reasoning	5	0	11	4
Commercial Mathematics	4	0	12	4
Geometric Reasoning	11	0	5	4
Linear Equation	5	0	11	4

Table 7.3c: Activities for which computer was used in teaching Math

In this academic year, while teaching Mathematics to class 9, how often have you used a computer for the following activities ?	**Never**		**Sometimes**		**Often**		**Always**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Practice solving mathematics problems	7	4	8	0	1	0	0	0
Play mathematics based games	7	4	9	0	0	0	0	0
Learn new mathematical concepts	6	4	9	0	1	0	0	0
For mathematical calculations	7	4	8	0	1	0	0	0
Making Graphs	8	4	7	0	0	0	4	0
Analyzing Data	9	4	7	0	0	0	0	0
Making Geometric figures	3	4	11	0	2	0	0	0
Watching instructional videos	7	4	8	0	1	0	0	0
Answering Assessment questions	11	4	5	0	0	0	0	0

Table 7.4a: Challenging conditions that limit teaching (Math)

Challenges in use of computers	**A lot**		**Some**		**A little**		**Not at all**		**Not applicable**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Shortage of computer hardware	3	2	8	1	3	0	2	0	0	1

Shortage of computer software	3	2	7	0	4	0	2	0	0	2
Shortage of support for using computers	3	1	8	2	4	0	1	0	0	1
Shortage of textbooks for student use	0	1	1	0	6	2	9	0	0	1
Shortage of other instructional equipment for students' use	3	0	2	1	4	2	7	1	0	0
Shortage of equipment for your use in demonstrations and other exercises	3	0	4	3	5	1	4	0	0	0
Inadequate physical facilities	1	0	8	2	4	2	3	0	0	0
Large class size.	1	0	5	1	2	0	7	3	1	0

Table 7.4b: Challenges with respect to students that limit teaching (Math)

Challenges faced in teaching Math for class 9	A lot		Some		A little		Not at all		Not applicable	
	T	C	T	C	T	C	T	C	T	C
Students with different academic abilities	9	1	4	2	2	1	1	0	0	0
Students come from a wide range of backgrounds (example economic, language).	9	0	4	3	2	1	1	0	0	0
Students with special needs (e.g., hearing, vision, speech impairment, physical disabilities, mental or emotional/psychological impairment)	1	0	0	1	11	2	4	0	0	1
Uninterested students	10	0	5	3	1	1	0	0	0	0
Disruptive students	3	0	6	2	6	1	1	0	0	1

Table 7.5: Preparedness to teach Math topics

How well prepared do you feel you are to teach the following topics?	Very well		Somewhat		Not well		Not applicable	
	T	C	T	C	T	C	T	C
Simple linear equations and inequalities, and simultaneous (two variables) equations	9	3	5	1	1	0	1	0
Direct and inverse proportions	8	2	6	2	1	0	1	0
Geometric properties of angles and geometric shapes (triangles, quadrilaterals, and other common	11	3	5	1	0	0	0	0
Congruent figures and similar triangles	8	2	7	2	1	0	0	0
Relationship between three–dimensional shapes and their two-dimensional representation	3	0	10	3	2	0	1	1

Using appropriate measurement formulas for perimeters, circumferences, areas of circles, surface areas and volumes	7	2	7	2	1	0	1	0
Cartesian plane - ordered pairs, equations, intercepts, intersections, and gradient Translation, reflection, and rotation	5	1	10	1	1	1	0	1

Table 7.6: Types of interactions with other teachers (Math)

Did you have the following types of interactions with other teachers either in your school or in your Telegram (COP) group?	**In my School**		**In Telegram**		**Both in School and in Telegram**		**Neither in school nor in Telegram**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Discussions about how to teach a particular concept	9	4	2	0	1	0	4	0
Working on preparing lesson plans	9	4	0	0	1	0	6	0
Visits to another teacher's classroom to observe his/her teaching	3	3	0	0	1	0	12	1
Informal observations of my classroom by another teacher	5	3	0	0	0	0	11	1
Working on preparing instructional materials	11	4	1	0	0	0	4	0
Discussions with other teachers on children's learning and experience	13	4	0	0	2	0	1	0
Clarifying doubts about the subject	11	4	1	0	3	0	1	0
Sharing resources or teaching ideas	8	3	0	0	6	0	2	1
Asking or answering on how to use technology in the class	7	3	1	0	4	0	4	1
Sharing experiences	8	4	1	0	7	0	0	0

Table 7.6: Types of interactions with other teachers (Math)

During the last year, have you participated in professional development training/workshops (other than CLIx) in the following?	Yes		No	
	T	C	T	C
Mathematics content	12	2	4	2
Mathematics pedagogy/instruction	8	2	8	2
Mathematics curriculum	3	1	13	3
Integrating information and communication technology into mathematics	5	1	11	3
Improving students' critical thinking or problem solving skills	7	2	9	2
Mathematics assessment	3	2	13	2

ICT training	4	1	12	3

Table 7.7b: Topics of TPD needed by Math teachers

Need to have the following included as part of the Math TPD Course	I strongly need training in this		I need some training in this		I don't need training in this	
	T	C	T	C	T	C
Subject understanding	2	0	10	4	4	0
Pedagogical tools and techniques	5	0	10	4	1	0
Integration of technology in teaching	8	0	8	4	0	0
Student Assessments	4	0	11	4	1	0

Table 7.7c: Form of TPD preferred by Math teachers

I would like teacher professional development to be offered in the form of	Yes		No	
	T	C	T	C
Face to face lectures	13	3	3	1
Computer based training sessions	14	4	2	0
Interactions with other teachers (peer learning)	16	4	0	0
Referring to books, magazines	11	4	5	0
Hands-on activities for teachers	15	4	1	0

Table 8.1a: Beliefs about teaching Science

Science teaching is about	Strongly agree		Agree		No opinion		Disagree		Strongly Disagree	
	T	C	T	C	T	C	T	C	T	C
Carrying out experiments	3	1	9	2	0	0	2	0	0	0
Memorizing the textbook content	2	0	9	2	0	0	3	1	0	0
Learning new terminology	3	1	10	2	1	0	0	0	0	0
Connecting Science with students' experiences	5	1	8	0	1	1	0	1	0	0
Understanding connections between different Scientific concepts	2	2	11	1	0	0	1	0	0	0

Learning to collect data and analyze	4	0	7	3	2	0	1	0	0	0
Thinking and reasoning	6	2	8	1	0	0	0	0	0	0

Table 8.1b: Science teachers' practices in classroom for students

During this academic session, during teaching science to the students in Class 9, how often did you usually ask them to do the following?	**Never**		**Some lessons**		**About half the lessons**		**Every or almost every lesson**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Observe natural phenomena and describe what they see	1	0	11	2	1	1	1	0
Watch me demonstrate an experiment or investigation	0	0	11	2	2	1	1	0
Design or plan experiments or investigations	5	1	7	2	1	0	1	0
Conduct experiments or investigations	4	1	9	2	1	0	0	0
Work together in small groups on experiments or investigations	4	2	10	1	0	0	0	0
Read their textbooks or other resource materials	0	2	6	1	3	0	5	0
Have students memorize facts and principles	0	0	4	0	1	0	9	3
Use scientific formulae and laws to solve routine problems	0	0	10	2	0	0	4	1
Give explanations about something they are studying	0	0	7	0	0	0	7	3
Relate what they are learning in science to their daily lives	0	0	6	1	3	1	5	1
Sometime deal with questions which are not the part of regular classroom discourse	3	0	9	2	0	1	2	0

Table 8.2a: Beliefs about Science learning

Beliefs about learning Science	Strongly agree		Agree		No opinion		Disagree		Strongly Disagree	
	T	C	T	C	T	C	T	C	T	C
Students who find Science difficult do not have the ability to learn Science	1	0	2	0	1	0	7	3	3	0
Students who stick to the procedures told in class do well in Science.	2	1	10	2	0	0	2	0	0	0
Boys are better at doing Science than girls.	1	0	1	0	2	2	9	1	1	0
Beliefs about learning Science	**Strongly agree**		**Agree**		**No opinion**		**Disagree**		**Strongly Disagree**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Games and activities are suitable for primary school, not for high school classes.	0	0	0	0	2	0	9	0	3	3
Discussions in class disrupt discipline and distract students.	0	0	1	1	2	0	8	1	3	1
Students can learn on their own, if given guidance.	2	1	10	2	1	0	1	0	0	0
Students should be corrected for mistakes they make, as soon as they make these mistakes.	1	1	6	2	3	0	4	0	0	0
Teaching Science is difficult.	0	0	3	1	0	0	8	2	3	0
We should spend more time teaching subjects other than Science.	0	0	5	1	3	0	6	2	0	0
I need to improve my concepts, so that I can teach Science better.	3	0	10	3	1	0	0	0	0	0
Students need exposure to new discoveries, history of science to make sense of the existing knowledge in the textbooks.	3	1	10	2	1	0	0	0	0	0

Table 8.2b: Beliefs about classroom practices in Science

In the Science classroom	Strongly agree		Agree		No opinion		Disagree		Strongly Disagree	
	T	C	T	C	T	C	T	C	T	C

I have no time to do additional activities, because I have to cover all content in the textbook.	0	0	6	2	1	0	7	1	0	0
Students need to know only the standard procedures because alternative procedures confuse them	0	0	5	1	4	0	3	2	2	0
Connecting Science with out-of-school contexts is not useful	0	0	2	0	3	0	5	3	4	0
When students make mistakes, the best remedy is to give them repeated practice of similar problems.	2	0	9	3	1	0	2	0	0	0
Only one concept is taught at a time because discussing many concepts together confuses students.	2	0	9	2	1	1	2	0	0	0
Making students give personal opinions about the content is not useful.	0	0	2	1	3	0	7	2	2	0

Table 8.2c: Frequency of classroom practices in Science

In the Science classroom	**Always**		**Frequently**		**Sometimes**		**Never**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**
I solve one/two exercise and ask students to solve the rest.	1	1	4	0	5	2	4	0
I do learning activities (games, puzzles, quizzes) with students	0	0	2	0	10	3	2	0
I do activities that involve group work that allow students to see, share and discuss their class work solutions with each other	0	1	5	0	9	1	0	1
I maintain silence/ discipline because students must concentrate and individually work	4	1	4	1	5	1	1	0
I encourage students to come up with their own ideas about how to solve problems.	3	1	2	1	9	1	0	0
I use charts, models as teaching materials.	2	1	2	1	10	1	0	0

Table 8.3a: Views about using technology in Science teaching

What are your views about using technology in your subject teaching?	**Strongly agree**		**Agree**		**Disagree**		**Strongly Disagree**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Slow Learners get left out in Lab sessions	0	0	3	0	10	2	1	1
Watching videos is more useful than interactives on computers.	0	0	3	0	11	3	0	0
Fear of committing mistakes increases with computer-aided learning	2	0	6	2	5	1	1	0
Computer-aided lessons should be optional only.	0	0	8	1	6	2	0	0
I do not like my students asking questions or interacting with each other	0	0	1	0	8	3	5	0
Children ask more questions after Science CLIx classes	0	0	10	2	4	0	0	1

Table 8.3b: Topics for which computer was used to teach Science

For which of the following topics, did you use computers in the last year	Yes		No	
	T	C	T	C
Motion	7	1	7	2
Light	3	2	11	1
Sound	2	2	12	1
Astronomy	0	0	14	3
Ecosystem	6	1	8	2
Respiration	3	1	11	2
Health and Disease	7	1	7	2
Chemical equation	5	1	9	2
Atomic Structure	5	2	9	1
Magnetism	1	0	13	3

Table 8.3c: Activities for which computer as used in teaching Science

How often did you use computers to teach the following topics?	Never		Sometimes		Often		Always	
	T	C	T	C	T	C	T	C
Look up ideas and information	5	1	9	1	0	1	0	0
Process and analyze data	7	1	7	2	0	0	0	0
Watch and analyze videos	6	1	7	2	1	0	0	0
Play games	8	1	6	2	0	0	0	0

Work with Simulation	8	0	5	3	1	0	0	0
Record and analyze their voice	9	3	5	0	0	0	0	0
Read lessons on computer	6	0	7	3	1	0	0	0
Answer assessment questions	7	1	7	2	0	0	0	0

Table 8.4a: Challenging conditions that limit teaching (Science)

Challenges in use of computers for teaching	A lot		Some		A little		Not at all		Not applicable	
	T	C	T	C	T	C	T	C	T	C
Shortage of computer hardware	4	0	5	1	3	2	2	0	0	0
Shortage of computer software	3	0	4	1	4	2	3	0	0	0
Shortage of support for using computers	2	1	7	2	3	0	2	0	0	0
Shortage of textbooks for student use	0	0	3	0	3	0	6	3	2	0
Shortage of other instructional equipment for students' use	1	0	4	2	8	1	1	0	0	0
Shortage of equipment for your use in demonstrations	1	1	6	2	4	0	2	0	1	0
Inadequate physical facilities	2	2	3	1	0	0	2	0	0	0
Large class size.	2	0	1	0	1	0	7	3	1	0

Table 8.4b: Challenges with respect to students that limit teaching (Science)

Challenges in teaching Science	A lot		Some		A little		Not at all		Not applicable	
	T	C	T	C	T	C	T	C	T	C
Students with different academic abilities	3	1	6	1	3	1	1	0	1	0
Students come from a wide range of backgrounds (example, economic, language)	5	1	8	2	1	0	0	0	0	0
Students with special needs (e.g., hearing, vision, speech impairment, physical disabilities, mental or emotional/psychological impairment) .	1	0	5	0	4	1	3	2	1	0
Uninterested students	1	0	6	1	5	1	2	1	0	0
Disruptive students	0	0	5	2	6	0	3	1	0	0

Table 8.5a: Preparedness to teach Science (Biology)

Preparedness in teaching the following topics - Biology	Not well prepared		Somewhat prepared		Very well prepared		Not applicable	
	T	C	T	C	T	C	T	C
Role of variation and adaptation in survival/extinction of species in a changing environment	2	1	8	0	2	1	2	1
Interaction of living organisms and the physical environment in an ecosystem (energy flow, food web, effect of changes, cycling of materials)	1	0	5	1	7	1	1	1
Trends in human population and its effects on the environment	1	1	4	0	8	1	1	1
Impact of natural hazards on humans, wildlife, and the environment	1	0	6	1	5	1	2	1

Table 8.5b: Preparedness to teach Science (Physics)

Preparedness in teaching the following topics - Physics	Not well prepared		Somewhat prepared		Very well prepared		Not applicable	
	T	C	T	C	T	C	T	C
Basic properties/behaviors of light (reflection, refraction, light and color, simple ray diagrams) and sound (transmission through media, loudness, pitch, amplitude, frequency, relative speed of light and sound)	1	0	7	2	5	1	1	0
Forces and motion (types of forces, basic description of motion, use of distance/time graphs, effects of density and pressure)	2	1	6	1	5	1	1	0

Table 8.5bc: Preparedness to teach Science (Chemistry)

Preparedness in teaching the following topics - Chemistry	Not well prepared		Somewhat prepared		Very well prepared		Not applicable	
	T	C	T	C	T	C	T	C
Classification and composition of matter (properties of elements, compounds, mixtures)	0	1	6	1	8	1	0	0
Particulate structure of matter (molecules, atoms, protons, neutrons, and electrons)	0	1	9	0	5	2	0	0
Solutions (solvent, solute, concentration/dilution, effect of temperature on solubility)	0	1	7	1	7	1	0	0

Properties and uses of common acids and bases.	0	0	8	2	6	0	0	1
Chemical change (transformation of reactants, evidence of chemical change, conservation of matter, common oxidation reactions - combustion and rusting)	1	0	5	2	8	0	0	1

Table 8.6: Types of interaction with other teachers (Science)

Did you have the following types of interactions with other teachers either in your school or in your Telegram (COP) group?	**In my School**		**In Telegram**		**Both in School and in Telegram**		**Neither in school nor in Telegram**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Discussions about how to teach a particular concept	6	2	0	1	1	0	7	0
Working on preparing instructional materials	8	1	0	2	1	0	5	0
Visits to another teacher's classroom to observe his/her teaching	3	2	1	0	0	0	10	1
Informal observations of my classroom by another teacher	4	0	0	0	0	1	10	2
Working on preparing lesson plans	12	2	0	0	0	1	2	0
Discussions with other teachers on children's learning and experience	13	2	0	0	0	1	1	0
Clarifying doubts about the subject	11	3	0	0	2	0	1	0
Sharing resources or teaching ideas	9	1	1	0	3	2	1	0
Asking or answering on how to use technology in the class	11	2	0	1	1	0	2	0
Sharing experiences	9	1	0	0	3	2	2	0

Table 8.6: Types of interaction with other teachers (Science)

During the last year, have you participated	Yes	No

in professional development training/workshops (other than CLIx) in the following?	T	C	T	C
Science content	9	1	5	2
Science pedagogy/instruction	6	1	8	2
Science curriculum	5	1	9	2
Integrating information technology into science	3	1	11	2
Improving students' critical thinking or inquiry skills	3	1	11	2
Science assessment	4	1	10	2
ICT training	8	1	6	2

Table 8.7b: Topics of TPD needed by Science teachers

Need for TPD	I strongly need training in this		I need some training in this		I don't need training in this	
	T	C	T	C	T	C
Subject understanding	2	0	9	2	3	1
Pedagogical tools and techniques	2	0	10	3	2	0
Integration of technology in teaching	6	0	6	3	2	0
Student Assessments	3	0	9	3	2	0

Table 8.7c: Form of TPD preferred by Science teachers

Form of TPD	Yes		No	
	T	C	T	C
Face to face lectures	11	3	3	0
Computer based training sessions	12	3	2	0
Interactions with other teachers (peer learning)	11	3	3	0
Referring to books, magazines	12	3	2	0
Hands-on activities for teachers	14	3	0	0

11. PRINCIPALS SURVEY

11.1. Demographics

Age: 60 percent of the principals in Mizoram reported to be 50 years and above 10 percent of the principals were reported to be in the age range of 40-49 years. 10 percent of the principals reported being in the age group of 30-39 while another 10 percent of the principals fell in the age group of 25-29 years.

Gender: 70 percent of the principals were males and 30 percent were females.

Social Category: All the principals in Mizoram belonged to the ST category

11.2. Access to Technology

80 percent of the principals accepted to having a data plan or access to internet while 10 percent of the principals had no access to the internet. 90 percent of the principals had access to a computer or a portable computer device. 33.33 percent of the principals did not have access to a computer or any other portable computer. Only 10 percent of the principals had no access to a computer or a portable computer device

11.2.1. Usage of Technology by Principals

Questions were asked regarding the regularity and purpose of usage of applications such as Facebook and WhatsApp to the principals. Questions were also asked about the level of usage of these Applications. 70 percent of the principals claimed that they were avid users of applications such as Facebook, WhatsApp etc. 20 percent of the principals reported that they use these applications occasionally and 10 percent of the principals reported that they had not heard about these application.

11.2.1. Usage of Technology by Principals

I use WhatsApp, messenger, Facebook...	On a daily basis	On a weekly basis	Rarely	Not Applicable
To communicate with Teachers	70	10	10	10
To communicate with other Principals	0	30	40	30
To communicate with Education Officials	0	30	50	20
To communicate with Superiors/Higher ups in the district/state level	10	10	50	30
To communicate with Family	70	0	20	10
To communicate with Friends	80	0	0	20

70 percent of the principals reported that they used applications such as WhatsApp, Facebook etc on a daily basis to communicate with teachers while 10 percent of the principals reported communicating with the teachers on a weekly basis. 40 percent of the principals reported that they

rarely used these applications to communicate with other principals while 30 percent of the principals reported that they used on a weekly basis to communicate with other principals.

50 percent of the principals reported that they rarely used these applications to communicate with education officials. 50 percent of the principals reported that they rarely used these applications to communicate with superiors.
70 and 80 percent of the principals reported that they used WhatsApp, Facebook etc to communicate with family and friends.

11.3. Beliefs about Use of Technology in Education

Questions were asked about the importance of different stakeholders in the adoption of technology in education.

Table 11.2: Stakeholders' importance for adoption of technology as per Principal

Rank Conferred	Computer Teacher	Class Teacher	Subject Expert	School Principal
Rank 1	12.5	12.5	37.5	37.5
Rank 2	12.5	62.5	25	0
Rank 3	50	12.5	25	12.5
Rank 4	25	12.5	12.5	50

The principals conferred the highest importance to the subject expert and School principals in the adoption of technology in education. The second most important professional in the adoption of technology in education was conferred to the class teacher. The third most important professional was conferred to the Computer teacher.

11.4. Role of Technology in Improving Education

Table 11.3: Principals' views on role of technology in education

How technology can help improve education in each of the following areas?	Strongly Agree	Agree	Disagree	Strongly Disagree
To improve student's board exam results	20	60	10	10
To deepen student's understanding about a particular	70	10	10	10
To practice the work they have done in the class	20	70	0	10
To make classroom interesting and enjoyable	60	30	0	10
To prepare students for future jobs	70	30	0	0
To increase student's knowledge of the world	60	40	0	0
To increase teacher's knowledge about the subject and how it can be taught	50	40	10	0
To complement teachers' efforts in the class	50	40	10	0

80 percent of the principals believed that technology can help improve student's board exam results and that technology can help deepen a student's understanding of a particular subject.

90 percent principals agreed and strongly agreed with the view that technology can help them practice work they have done in the class. Almost all principals agreed and strongly agreed with the rest of the questions asked in this section.

11.5. Factors Facilitating Technology Integration in Schools

Table 11.4: Factors helpful in integration of technology in Schools (Principals)

Factors Helpful in Integration of Technology in Schools	Very helpful	Helpful	Unhelpful	Very unhelpful
Teacher support to integrate technology	40	60	0	0
Support of education officials in technology integration	20	40	40	0
Support in handling repairs	30	30	20	20
Support in classroom management and batching of students	20	70	10	0
Support in teacher training management	40	50	10	0
Support in ensuring lab functionality	30	50	20	0
Support in maintaining teacher motivation	30	50	20	0
Support in using fund for repairs	20	10	60	10

Most of the principals found the support of teachers would be helpful or very helpful in integration of technology in schools. 60 percent of the principals thought that support of education officials and support in handling repairs would be helpful or very helpful in integration of technology in schools. Almost all principals reported that a support in classroom management and batching, teacher training management, ensuring lab functionality and maintaining teacher motivation would be helpful or very helpful in integration of technology in education. 30 percent of the principals thought that a support in using funds for repairs would be helpful in integration of technology in education. 40 percent of the principals thought that teacher support and support in teacher management was the most critical factor in the integration of technology.

11.6. Concerns Related to Integration of Technology in School Education

Table 11.5: Concerns related to integration of technology (Principals)

Concerns	Strongly Agree	Agree	Disagree	Strongly Disagree
The use of technology in school will disturb the existing teacher-student relationship	0	10	60	30
Using technology in schools will add to my workload.	0	40	60	0
The use of technology will increase the time taken for completing the School Curriculum	0	30	50	20
Technology is likely to replace teachers from their job.	0	10	50	40
The school has inadequate physical space for integrating technology	20	10	50	20
The school has inadequate resources of devices and electricity for the integration of technology in the daily practice.	20	20	50	10

The school has inadequate teachers for the integration of technology	20	10	60	10
Concerns	Strongly Agree	Agree	Disagree	Strongly Disagree
Use of technology may not help to improve our board results.	0	30	50	20
I do not have access to dedicated human resources that can help me to integrate technology in my school.	0	10	70	20

80 percent of the school principals reported that it is extremely important to integrate technology in high schools. 90 percent of the principals disagreed to the concern that technology would disturb the teacher student relationship. 70 percent of the principals disagreed to the statement that technology use would increase their workload.
70 percent of the principals disagreed to the concern that technology would increase the time taken to complete the school curriculum. 90 percent of the principals disagreed with the concern that technology would replace teachers in the future. 70 percent of the principals agreed that there was lack of physical space for the integration of technology in schools. 60 percent of principals acknowledged that there were inadequate resources of device and electricity in the schools. 70 percent of principals agreed that their school had inadequate teachers for the integration of technology. 70 percent of the principals disagreed with the statement that technology integration may not improve board exam results. 90 percent of the principals agreed that they do not have access to adequate human resources to integrate technology in schools.

11.7. Effective Integration of Technology

Table 11.6: Initiatives by Principals to integrate technology in school

To integrate technology effectively at my school, I would like to...	Strongly Agree	Agree	Disagree	Strongly Disagree
Learn how technology is a better way of doing things compared to conventional methods of teaching.	10	90	0	0
Learn how technology has been integrated in other schools and how it can be implemented at my school.	0	100	0	0
Learn how students will respond to the use of technology in classroom learning and then promote effective uses at my school.	10	80	10	0
Learn how to integrate technology in classroom teaching	30	70	0	0
To integrate technology effectively at my school, I would like to make sure that the new CLIx program does not clash with other new and innovative programs at my school.	30	40	30	0

11.8. Dependency on Field Resource Coordinator

Table 11.7: Dependency on field resource coordinator

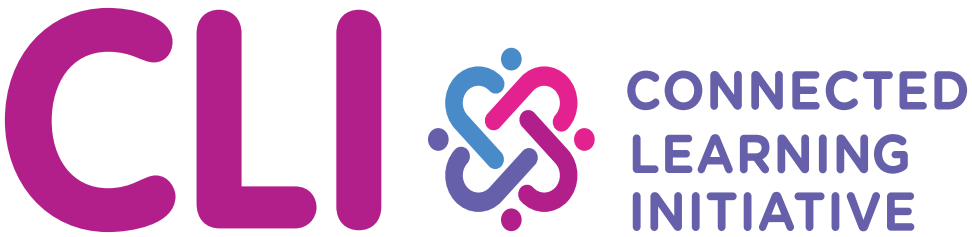
My dependency on field resource coordinator would be less...	Strongly Agree	Agree	Disagree	Strongly Disagree
If there is higher interest among the teachers with regard to utilization of the digital content and resources provided.	10	80	10	0
If there is higher sense of ownership among teachers in the upkeep of lab functionality	0	80	20	0
If a few students take initiative basic CLIx related activities like student enrolment and logging	0	80	20	0
If there is easy to use reference material for basic troubleshooting	10	60	30	0

90 percent of the principals agreed that the dependence would decrease if teachers were more interested with regard to utilization of digital content. 80 percent principals thought that the dependency on field resource coordinator would decrease if students took initiative of basic CLIx activities.

80 percent of the principals agreed that a higher sense of ownership in the upkeep of lab functionality by teachers would reduce dependence on field resource persons. 70 percent of the principals believed that the dependency on field resource coordinator would decrease if there is an easy to use reference material for basic troubleshooting.

Key findings:

In Mizoram, the following were the levels of internet penetration and access to computers observed; In terms of usage of applications such as Whatsapp, Messenger etc, 80 per cent of principals agreed to use it to communicate with friends. Almost 80 per cent of the principals agreed that they used these applications to communicate with teachers on a regular basis. In terms of importance of stakeholders in the integration of technology in education, most principals accorded the first rank to both the subject expert and the school principal. A positive perception of principals with respect to the role of technology in improving education emerged.


CLI
CONNECTED
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INITIATIVE