Assessment of the Availability and Barriers of ICT for Teaching and Learning in Schools of Mizoram

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Abstract

The covid-19 pandemic forces the schools and teachers to carry on teaching though online mode since there is no other alternatives during lockdown periods. The world is going through the technological revolution and adoption of new technologies in the education system across all levels of education across the world. This study investigates the availability of ICT in schools, and the barriers of using ICT in schools, using schools in Mizoram, India as a case study. It was observed that availability of ICT facilities (computers and accessories, internet connectivity, digital devices etc.) need to be improved. The research also identified the barriers that are hindering the ICT utilization in schools, among them are Lack of funding, Insufficient number of internet connected computers, not enough computers, Insufficient number of the interactive whiteboard or any other educational software, Outdated, incompatible or unreliable computers. Recommendations were put forward on how to improve ICT availability and utilization. Conclusions were drawn from the findings.

Key words: ICT, availability, barriers, schools.

Introduction

There are 28 states and 9 Union Territories in India. Education is concurrent list in India, an items of concerns of both the centre and the states. The Ministry of Education and Social Welfare of the central government included the Educational Technology (ET)Project in the Fifth Five Year Plan in 1971.The Nation Policy of Education (NPE1986,p.22) stated that "ET will be employed in the spread of the useful information, the training and the retraining of teachers, to improve quality education, sharpen awareness of art and culture, and inculcate abiding values etc., both in the formal and non-formal sectors" . The revised NPE,1992 also laid emphasis on the use of educational technology for improving both "quality" and "quantity" of education. National Education Policy (NEP 2020), clause 23.3. stated that “Use and integration of technology to improve multiple aspects of education will be supported and adopted, provided these interventions are rigorously and transparently evaluated in relevant contexts before they are scaled up” (NEP 2020 p.56). In the field of education, the use of computer, smart phones, LCD Projector and Internet technology become a useful tools for data creation, store, share or transmit, exchange information etc., and Educational Technology (ET) then converted into ICT. The spread of covid-19 reveals the importance of ICT integration in Teaching and learning and teachers and students across the country are forced to use ICT by this pandemic.

Mizoram is one of the states in India, situated in the north eastern region. It shares 404 km and 318 km long international borders with Myanmar and Bangladesh respectively. Geographical

location of Mizoram is 92^{o}.15'Eto93^{o}.29'E Longitude and 21^{o}.58'Nto24^{o}.35'N Latitude. Aizawl is the capital city of Mizoram. There are 11Districts, 23 Sub-Divisions and 26 RD Blocks. Its area covers21,081 square kilometers. According to 2011 census, there are 830 villages, 222,853 Households, 10,97,206 population and literacyrateof91.33%.School Education in Mizoram is categorized broadly as Elementary and Secondary. Elementary covers classes 1 to 8 and secondary covers classes 9 to 12. In Mizoram, the School Education Department look after Government, Aided and Private Schools except Central Schools and Elementary Schools within the three District Councils – Lai Autonomous District Council, Mara Autonomous District Council and Chakma Autonomous District Council. This study covers only the schools under School Education Department, Government of Mizoram.

The following tables show number of schools in Mizoram for the year 2020-21.

Table 1: Primary and Upper Primary Schools in Mizoram

No. of Schools : Elementary												*Source : Udise + 2020-21*
Sl/ No	Districts	Primary School					Upper Primary					GRAND TOTAL
		Govt.	Aided	Private	Central	Total	Govt.	Aided	Private	Central	Total	
1	Aizawl	217	0	198	2	**417**	166	23	172	3	**364**	**781**
2	Champhai	76	0	49	1	**126**	61	5	47	1	**114**	**240**
3	Hnahthial	48	0	22	0	**6570**	30	6	17	0	**53**	**123**
4	Khawzawl	40	0	25	0	**65**	37	0	21	1	**59**	**124**
5	Kolasib	86	0	50	0	**136**	72	5	40	1	**118**	**254**
6	Lawngtlai	227	0	87	0	**314**	157	0	55	1	**213**	**527**
7	Lunglei	205	0	92	1	**298**	138	19	57	2	**216**	**514**
8	Mamit	142	0	54	0	**196**	103	7	33	1	**144**	**340**
9	Saiha	118	0	13	0	**131**	78	0	12	0	**90**	**221**
10	Saitual	57	0	35	0	**92**	53	0	33	0	**86**	**178**
11	Serchhip	66	0	45	0	**111**	53	9	35	2	**99**	**210**
Mizoram		**1282**	**0**	**670**	**4**	**1956**	**948**	**74**	**522**	**12**	**1556**	**3512**

Table 2: Secondary and Higher Secondary Schools in Mizoram

No. of Schools : Secondary												*Source : Udise + 2020-21*
Sl/ No	Districts	Secondary School					Higher Secondary					GRAND TOTAL
		Govt.	Aided	Private	Central	Total	Govt.	Aided	Private	Central	Total	
1	Aizawl	63	31	102	3	**199**	12	8	54	2	**76**	**275**
2	Champhai	21	18	15	1	**55**	1	0	8	0	**9**	**64**
3	Hnahthial	12	6	4	0	**22**	1	2	5	0	**8**	**30**
4	Khawzawl	9	5	14	1	**29**	0	2	3	1	**6**	**35**
5	Kolasib	26	10	10	1	**47**	2	2	5	1	**10**	**57**
6	Lawngtlai	29	5	31	1	**66**	3	0	18	1	**22**	**88**
7	Lunglei	43	17	35	2	**97**	4	1	23	0	**28**	**125**
8	Mamit	31	11	15	1	**58**	2	0	3	0	**5**	**63**
9	Saiha	17	10	13	0	**40**	1	0	10	0	**11**	**51**
10	Saitual	24	12	14	0	**50**	3	1	6	0	**10**	**60**
11	Serchhip	22	13	13	1	**49**	2	3	7	1	**13**	**62**
Mizoram		**297**	**138**	**266**	**11**	**712**	**31**	**19**	**142**	**6**	**198**	**910**

Literature survey

Education around the world is trying to incorporate ICT in teaching learning process to develop high order thinking skills and to impart knowledge among students. Information communication technology is a versatile instrument as it has the capability not only to engage students in instructional activities to increase their learning, but also helping them in solving complex problems to enhance their cognitive skills. ‘‘ICT-supported learning environments could be beneficial to a constructivist teaching approach which will be helpful to students in their development’’ (A.Guma, 2013). United Nations Educational, Scientific and Cultural Organization(UNESCO,2010) defines ICT as the forms of technology that are used to transmit, process, store, create, display, share or exchange information by electronic means(Edumadze,2015). ICT consist of the hardware, software and media for collection, storage, processing, transmission and presentation of information and related services(Karoline&Celine,2016).The National Policy on ICT(2012) focused on use of ICT in School Education to devise, support, catalyze, and sustain ICT. It promotes the ICT enabled activities and processes in order to improve access, quality and efficiency in the school system (Singh,2019).

The integration of ICT in the classroom teaching-learning is very important as it provides opportunities for teachers and students to store, manipulate, and retrieve information, encourage independent and active learning, motivate teachers and students to continue learning outside school hours. It also helps to prepare and plan lessons and design study materials and effective delivery of such materials. ‘‘There is a worldwide need felt for integrating ICT into education in order to improve the pedagogy to reflect the societal change’’ (Plompetal, 2007).

Use of ICT in education develops higher order skills such as collaborating across time and place and solving complex real world problems(Mason-2000, Lim and Hang-2003, Bhattacharya and Sharma-2007). Thus ICT can be used to prepare the workforce for the new global economy and information society (Kozma-2005). E-education can provide access to the best gurus and the best practice or knowledge available (UNESCO 2000). The globalization process has always created a large market of offshore students. To reach them, information technology is the only convenient medium, which can offer education as a service (Bhattacharya and Sharma-2007). (Charles 2012) have found that access to technological resources is one of the effective ways to teachers’ pedagogical use of ICT in teaching which ends up into bringing a change in students’ behavior and performance.

There are also a number of difficulties which act as barriers and prevent integration of ICT into the classroom. As (Jones 2010) defines, a barrier is that which makes the things difficult to happen. Pauland Mondal(2012)found out that there is significant association between ICT and the quality of secondary education. The main barriers of using ICT in schools were lack of financial resources, poor access to the internet, limited trained teachers, and lack of policy for using ICT in teaching-learning process (Kumar,2015). Lack of funding, lack of ICT integration and lack of connectivity were found to be the most critical barriers to the use of ICT in secondary schools. Teacher's personal factors such as proficiency in computers, computer experience, time spent on

computers, internet connection at home and ownership of computer shad influence on barrier factors (Prasadet al.,2015).

Need for the Study

Nowadays, ICT has become an integral part of teaching learning process, but it is not always workable in most of the schools in Mizoram. National policy on ICT for school education came into being in 2013 in India. But schools are still unable to implement the recommendations of the policy. Teachers are unable to evolve effective instructional material to cope with the emerging trends in the curriculum and pedagogy due to many constraints. The importance of ICT in Education can be seen during covid-19 pandemic. Teachers are compelled to use ICT tools for content creation, delivery and assessment during pandemic. The importance of ICT will remain same for post covid-19 pandemic. The present study is an effort to identify the availability of ICT and the barriers for effective use of ICT in Teaching and Learning in schools within Mizoram state.

The following objectives were formulated:

- To study the availability of ICT in schools.
- To study access related barriers in the use of ICT in schools.

Methodology

The present study is descriptive study and a questionnaire was developed for the Head of institutions under School Education Department, government of Mizoram. The questionnaire included items related to availability and barriers of ICT integration in teaching learning process in schools. The questionnaire was developed using google form and pdf and distributed through the Education Department, by requesting Director of School Education, Government of Mizoram, to convey the questionnaire through all the District and Sub-Divisional Education officer to the concerned Head of Institution. Due to Covid-19 pandemic, questionnaire cannot be distributed in physical and email and WhatsApp were utilized for distributing the google form using a link.

Population of study

There are 4422 schools from Primary schools to Higher Secondary schools in Mizoram state in 2020-21 as per Udise Plus data (Table 1 and 2 above).

Out of these 3512 are Elementary (1956 is Primary Schools and 1556 Upper Primary schools) and 910 are Secondary Schools (712 Secondary and 198 Higher Secondary schools).

There are 33 Central schools which are not under the government of Mizoram. Besides 748 elementary schools within Lawngtlai and Saiha districts are under District council administration and so, they are not included in the study.

So, the total schools under study are 3641 schools. The study was carried out during July to September, 2021.

1490 schools responded the questionnaire which is 40.9% of the population under study.

Analysis and interpretation of the data.

The data were analyzed and interpreted as follows:

Table 3: Availability of ICT tools in Schools

AVAILABILITY OF TOOLS IN SCHOOLS							
Sl No.	**QUESTION**	**Elementary**		**Secondary**		**All (Elementary and Secondary)**	
		YES	**NO**	**YES**	**NO**	**YES**	**NO**
1	Does your school have Electric connection?	797 (78.3%)	221 (21.7%)	451 (95.6%)	21 (4.4%)	1248 (83.7%)	242 (16.2%)
2	Does your school have computer or laptop?	499 (49%)	519 (51%)	399 (84.5%)	73 (15.5%)	898 (60.2%)	592 (39.7%)
3	Does your school have LCD Projector?	42 (4.1%)	976 (95.9%)	174 (36.9%)	298 (63.1%)	216 (14.5%)	1274 (85.5%)
4	Does your school have internet connection?	54 (5.3%)	964 (94.7%)	124 (26.3%)	348 (73.7%)	178 (11.9%)	1312 (88%)
5	Does your school have interactive board?	87 (8.5%	931 (91.5%)	141 (29.9%)	331 (70.1%)	228 (15.3%)	1262 (84.7%)
6	Does your school have educational software (Freeware or licensed)?	12 (1.2%)	1006 (98.8%)	39 (8.3%)	433 (91.7%)	51 (3.4%)	1439 (96.5%)
7	Does your school have smart classroom or ICT enable classroom?	76 (7.5%)	942 (92.5%)	66 (14%)	406 (86%)	142 (9.5%)	1348(90.4%)
8	Does your school have YouTube channel for education?	18 (1.8%)	1000 (98.2%)	37 (7.8%)	435 (92.2%)	55 (3.6%)	1435 (96.3%)
9	Does your school have WhatsApp group for	731 (71.8%)	287 (28.2%)	458 (97%)	14 (3%)	1189 (79.8%)	301 (20.2%)

	teaching-leaning ?						
10	Does your school have Social Media (Facebook?	51 (5%)	967 (95%)	110 (23.3%)	362 (76.7%)	161 (10.8%)	1329 (89.1%)
11	Does your school have computer room or lab?	65 (6.4%)	953 (93.6%)	277 (58.7%)	195 (41.3%)	342 (22.9%)	1148 (77.0%)

As found in table 3, most of the schools have electric connection (power supply), 242 schools (16.2%) are not having power supply. 60.2% are having computer or laptop. Only 14.5% are having LCD projector. 11.9% have internet connection and 15.3% have interactive board. Almost all the schools are not having educational software, only 3.4% are having educational software. Only 9.6% are having ICT enabled classroom. A very few schools are having YouTube channel (3.6%). However, most of the schools are having WhatsApp group for teaching-learning. Only 10.8% are using Facebook / Instagrams and 22.9% are having computer room or lab.

Access to the technology (software and hard ware both) itself is the most important component in the use of ICT and the data revealed that internet and software/hardware are not available to the desired extent. Computers were available but teachers reported that accessories required for ICT integrated teaching and learning are not available in most schools. Majority of the schools have either no or disruptive internet connectivity which makes the use of ICT difficult especially during the covid-19 pandemic.

Although the government is emphasizing ICT integration in the teaching learning process at all levels but the responses of the teachers reveal that there is still a dearth of ICT related infrastructure including computer labs and smart classrooms.

Table 4: Barriers of using ICT in Schools

BARRIER OF USHING ICT IN SCHOOLS								
Sl. No	**Questions**	**Not a barrier**		**Small barrier**		**Moderate barrier**		**Great barrier**	
1	Not enough computers	127	8.5%	160	10.7%	540	36.2%	663	44.5%
2	Outdated, incompatible or unreliable computers	207	13.9%	221	14.8%	477	32.0%	585	39.3%
3	Lack of adequate skills of teachers.	406	27.2%	338	22.7%	519	34.8%	227	15.2%
4	Insufficient number of the interactive whiteboard or any other educational software	174	11.7%	206	13.8%	513	34.4%	597	40.1%
5	Inadequate training is given to the teachers for using ICT in the Classroom	169	11.3%	256	17.2%	575	38.6%	490	32.9%
6	Restrictive time table	621	41.7%	347	23.3%	404	27.1%	118	7.9%
7	Lack of administrative support	434	29.1%	293	19.7%	523	35.1%	240	16.1%
8	Lack of technical support or	208	14.0%	292	19.6%	557	37.4%	433	29.1%

	device								
9	Lack of confidence regarding the use of ICT	481	32.3%	415	27.9%	445	29.9%	149	10.0%
10	Lack of funding	100	6.7%	144	9.7%	521	35.0%	725	48.7%
11	Using ICT in teaching and learning not being a goal of the school	598	40.1%	421	28.3%	368	24.7%	103	6.9%
12	Lack of flexibility due to time constraint and over load of work	419	28.1%	451	30.3%	478	32.1%	142	9.5%
13	Insufficient number if internet connected computers	104	7.0%	111	7.4%	334	22.4%	941	63.2%
14	The pressure to prepare students for exams and tests	475	31.9%	387	26.0%	480	32.2%	148	9.9%
15	Inadequate space and infrastructural facilities	233	15.6%	214	14.4%	499	33.5%	544	36.5%
16	No or unclear benefit of using ICT for teaching	600	40.3%	348	23.4%	414	27.8%	128	8.6%
17	Lack of interest of teachers	823	55.2%	283	19.0%	290	19.5%	94	6.3%

As seen from Table 4 above, the main barriers of using ICT in schools are - Lack of funding, Insufficient number of internet connected computers, Not enough computers.

Next to main barriers are - Insufficient number of the interactive whiteboard or any other educational software, Outdated, incompatible or unreliable computers, Inadequate space and infrastructural facilities, Inadequate training is given to the teachers for using ICT in the classroom, Lack of technical support or advice, Lack of administrative support, Lack of adequate skills of teachers, Lack of confidence regarding the use of ICT, The pressure to prepare students for exams and tests, Lack of flexibility due to time constraint and overload of work,

Least barrier includes - No or unclear benefit of using ICT for teaching, Restrictive time table, Using ICT in teaching and learning not being a goal of the school, Lack of interest of teachers.

Table 5: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.898
Bartlett's Test of Sphericity	Approx. Chi-Square	7037.177
	df	91
	p-vlaue	0.0001

Table 5 shows the values of Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) and Bartelett's test of sphericity. The value of Kaiser-Meyer-Olkin for MSA is found as 0.898 and indicating that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors. Bartlett's test is highly significant ($p<0.001$) and therefore factor

analysis is appropriate as there are some relationships between the variables included in the factor analysis model.

Table 6: Communalities

Variable	Initial	Extraction
Not enough computers	0.470	0.512
Outdated, incompatible or unreliable computers	0.436	0.449
Insufficient number of the interactive whiteboard or any other educational software	0.333	0.378
Restrictive time table	0.395	0.443
Lack of technical support or advice	0.421	0.475
Lack of confidence regarding the use of ICT	0.421	0.471
Lack of funding	0.369	0.403
Using ICT in teaching and learning not being a goal of the school	0.409	0.453
Lack of flexibility due to time constraint and overload of work	0.430	0.499
Insufficient number of internet connected computers	0.381	0.438
The pressure to prepare students for exams and tests	0.378	0.432
Inadequate space and infrastructural facilities	0.265	0.280
No or unclear benefit of using ICT for teaching	0.391	0.449
Lack of interest of teachers	0.352	0.389

Table 6 shows the values of communalities of the variables before and after extraction. It is known that the communality of variable is the total amount of variance shared with the other variables. The communality of not enough computers is 0.512 and it infers that 51.2% of the variance associated with not enough computers is shared with other variables. Similarly, 44.9%, 37.8%, 44.3%, ..., 38.9% of the variances associated with Outdated, incompatible or unreliable computers, Insufficient number of the interactive whiteboard or any other educational software, Restrictive time table, ..., Lack of interest of teachers respectively are shared with other variables.

Table 7: Total Variance Explained

Factor	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.921	35.152	35.152	4.358	31.128	31.128	3.307	23.619	23.619
2	2.266	16.183	51.335	1.712	12.230	43.358	2.763	19.739	43.358
3	0.867	6.193	57.528						
4	0.742	5.299	62.826						
5	0.716	5.114	67.940						
6	0.658	4.698	72.639						
7	0.565	4.034	76.672						

8	0.552	3.945	80.618						
9	0.506	3.611	84.229						
10	0.480	3.428	87.656						
11	0.471	3.365	91.022						
12	0.464	3.311	94.333						
13	0.434	3.098	97.431						
14	0.360	2.569	100.000						

Table 7 lists the eigenvalues associated with each linear factor before extraction, after extraction and after rotation. Before extraction, as same as number of original variables i.e., 14 factors are identified within the data set. The eigenvalue associated with each factor represents the total variance explained by that particular factor and it is also expressed in terms of percentage of variance explained and cumulative percentage. The first factor i.e., Not enough computers explains 35.152% of the total variance and similarly 16.183% of variance is explained by second factors and so on. It is clear that the first two factors explain relatively large amounts of variance whereas subsequent factors explain only small amounts of variance.

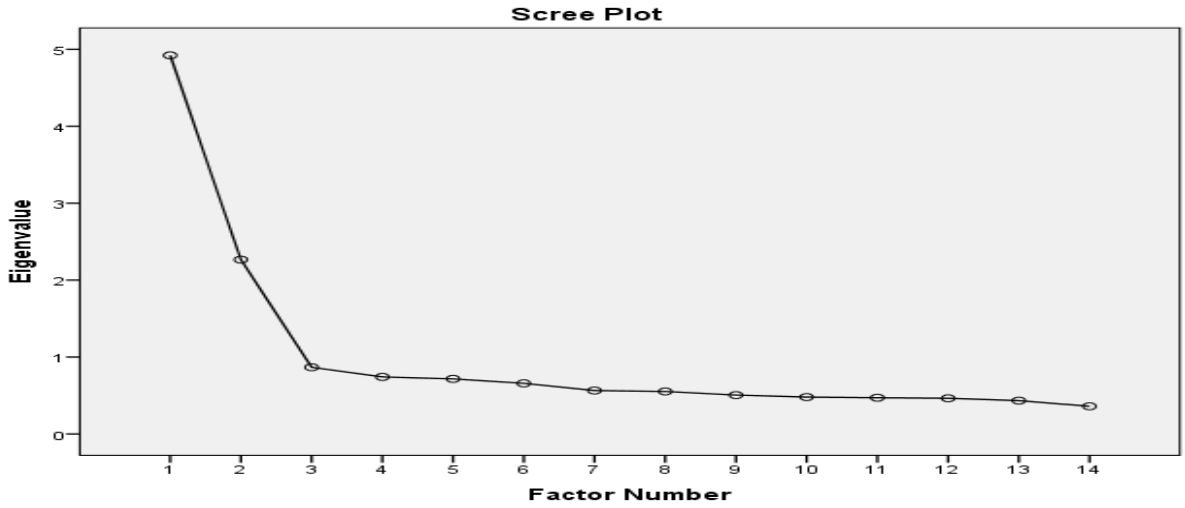

Figure 1: Scree plot

Table 8: Reliability Test and Rotated Factor Matrix[a]

Variable	Factor	
	1	2
Cronbach's Alpha	0.848	0.971
Lack of flexibility due to time constraint and overload of work	0.694	
No or unclear benefit of using ICT for teaching	0.667	
Lack of confidence regarding the use of ICT	0.666	
Using ICT in teaching and learning not being a goal of the school	0.649	
The pressure to prepare students for exams and tests	0.640	

Restrictive time table	0.631	
Lack of interest of teachers	0.621	
Not enough computers		0.715
Outdated, incompatible or unreliable computers		0.667
Insufficient number of internet connected computers		0.654
Lack of funding		0.618
Lack of technical support or advice		0.596
Insufficient number of the interactive whiteboard or any other educational software		0.589

In table 8, the two coefficients displayed show that the good reliability of the two factors. Finally, two factors are associated as barrier towards online training. Two factors are named as Personal and institutional

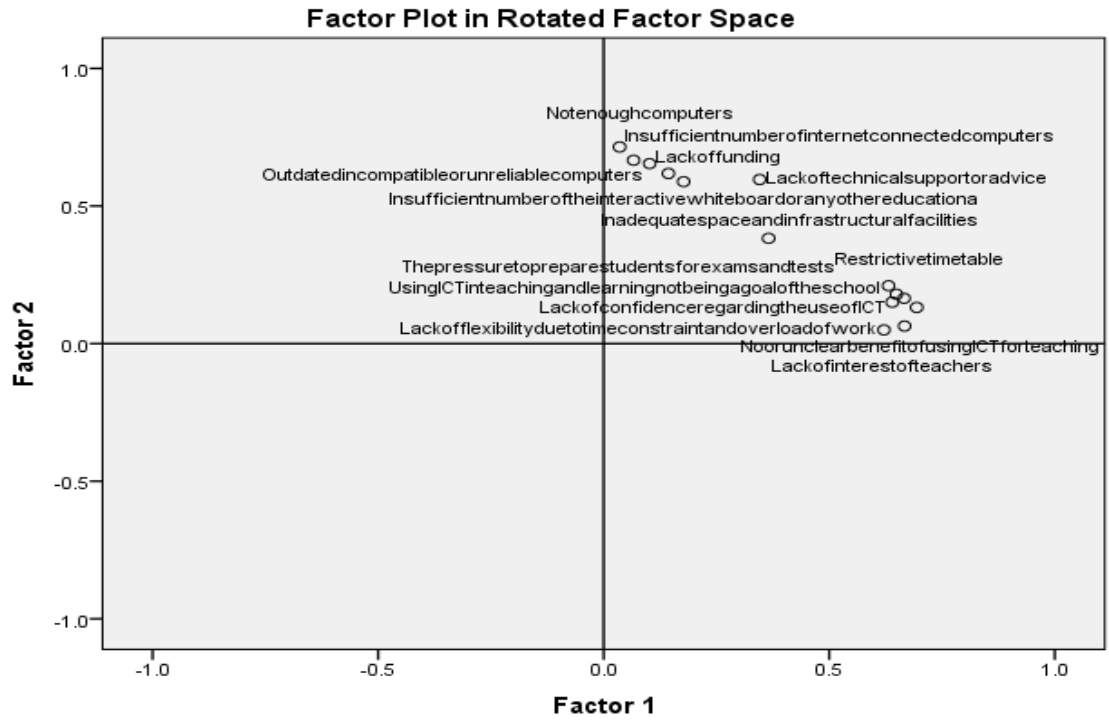

Figure 2: Component plot in rotated space

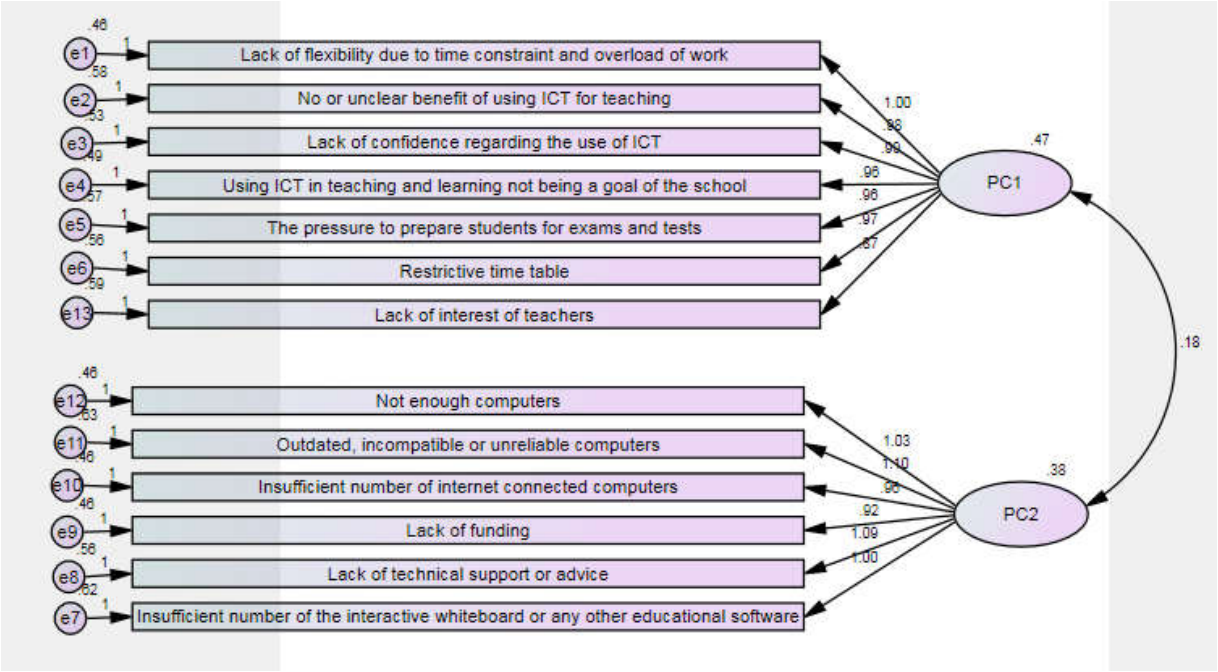

Figure 3: Factor Diagram (rotated solution).

In factor 1, 7 variables have shown higher loadings. All the variables indicate about personal barrier, according to the response of the participants. So, we can name as 'Personal'. Lack of flexibility due to time constraint and overload of work, no or unclear benefit of using ICT for teaching, lack of confidence regarding the use of ICT, using ICT in teaching and learning not being a goal of the school, the pressure to prepare students for exams and tests are the problems of the participants. Due to the restricted time table, the teachers may also lack of interest of teaching as e-learning is new to them. In factor 2, not enough computers, outdated, incompatible or unreliable computers, insufficient number of internet connected computers, lack of funding, lack of technical support or advice, insufficient number of the interactive whiteboard or any other educational software and inadequate space and infrastructural facilities are barriers towards the institution.

Conclusion

Though the study do not covers all the schools in Mizoram, but this is the mirror that reflects the trend in most schools regarding ICT integration in teaching learning process in Mizoram. As far as institutional barriers are concerned, enough computers, internet connection, and technical support will facilitate them to overcome barriers to participate online learning.. The government seems to have good intention but infrastructural provision is not as is needed for the appropriate use of ICT. Implementation of the ICT Policy of School Education seems to be a distant dream unless adequate infrastructure, hardware/software are made available in the schools. An important factor for personal is lack of confidence regarding the use of ICT. So, Proper training is also required for making ICT effective in education because the technologies are changing very fast.

Implications

The findings of this study implies that the schools should make sure that computer labs and smart classrooms are made functional. The government should allocate funds so that the required software/hardware and digital devices are provided to the schools for the effective use of ICT. School Education Department should arrange the training programmes at frequent intervals so that the teachers can make better use of changing technologies. The government should have a very strong will to provide all financial and administrative support to ensure the use of ICT in schools as an effective tools for teaching learning which will be needed even after the covid-19 pandemic.

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