

# Need for ergonomic intervention on academic environment of Assam: A district level analysis of primary schools

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**Abstract:** Education is not separated from physical and mental health of students. In India, while the primary school facilities are improving with reference to drinking water availability, proper sanitation, school building / classrooms with adequate illumination / daylight, and cooking / dining facility as per some ensuring Government projects. However Assam, perhaps due to some snags / impediments, is lacking behind the national level in these facilities. In this perspective, the present review based research was endeavoured with two main objectives: (i) to explore the availability of minimal school facilities for primary school students and (ii) to envision the need and feasibilities for ergonomic interventions to improve these scenario in the primary education system of Assam. District level secondary data till 2014-15 was collected from central and state government resources. A critical review of these data revealed some serious concerns, needing urgent attention and ergonomic interventions therein, like availability of drinking water facility; hygienic toilets (preferably separate for boys and girls ) with efficient sewage disposal system; and healthy cooking / dining area (those having mid-day meal facility).

Keywords: Ergonomic interventions, School hygiene, Basic education

## 1 Introduction

Education is perhaps the most powerful and influencing means of development. It is an integral contributor to psychophysical and socio-cultural growth. School environment is very important for physical and mental health of the students. The students, during the school hours are affected by the environment/infrastructure of the school. The various factors in this regards are drinking water, toilet, light, cooking facility etc. School Sanitation and Hygiene Education is an attractive issue not only from health perspective but also from social point of view. It is based on the premise that children have a right to basic facilities such as school toilets, safe drinking water, clean surroundings and hygienic atmosphere. The provision of safe drinking water and sanitation facilities in school is a first step towards a healthy physical learning environment benefiting both learning and health.

However, very few studies have been observed on children's health. A worth-to-mention Staff Information Report by Young et al. (2003), prepared on effect of school facilities on education output in the rural and urban school settings of USA, recognized to some important aspects as below.



a. Scoring of the students improves as the condition of the facility, like light in the classroom, air-conditioning inside the classroom, etc. improve.

b. Excessive temperatures caused stress in students. Also color and light has been observed to have a cause-effect relationship between with students' blood pressure

In this series of studies, physical comfort and health showed strong linkages to students' academic performance, psycho-social development, and teachers' instructional performance. Studies have been carried out in India also. Singh and Arora (2014) surveyed two public schools of Delhi-NCR region and found a significant relationship between classroom lighting and students' concentration and performance, but found no correlation between lighting and health exposure.

In this perspective, the present review-based research was endeavoured with two main objectives: (i) to explore the likely barriers of communication among primary school students in terms of general hygiene; and (ii) to envision the scope for ergonomic interventions for improvement of health and hygiene scenario in the education system of Assam.

## 2 Methodology

We selected Assam, the gateway to North-eastern India, for the present review-based descriptive analytical research. The study was carried out at the district level with a cumulative comparison between the period of 2009–10 and 2013–14.

### 2.1 Parameters / Indicators:

Different variables are used to understand the relationship between school environment and psycho-physical health of the students by different groups of researches based on their area of interest. For example, Young et al (2003) have selected various physical, psychological and socio-economic variables like school building, colour, light, air, temperature etc. In our study, we identified five variables as important with reference to the Indian context to assess the current scenario real-time and suggest some relevant ergonomic interventions, namely Electricity, Drinking Water, Girls Toilet, Common Toilet and Kitchen Shed. All the data were compared on total number of schools bases.

### 2.2 Source of Information / Methods

The secondary data for 2009-10 and 2013-14 at district level was compiled from the District Information System for Education (<http://www.dise.in>, within permissible context). Assam, the North-Eastern state of India was our area of interest. The reason for identifying Assam as our area of focus was that, it represents the largest of the 8 states of North-Eastern Region and comprises of hill, valley and plain terrains with mixed population having large diversity in socio-cultural and economic representations.

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### 3 Results and Discussion

#### 3.1.1 Electricity.

A total of 27 districts have been evaluated with an average of 1690.7 schools in each district. The electricity is considered from the year 2011 onwards, because no data were found prior to that period for any of the districts of primary schools. In 2011-12, average percentage of electricity in primary schools of Assam was 8.1, while in 2013-14 it was 9.27. Among all the districts of Assam, Kamrup Metro has maximum electricity facility in its primary schools. The reason is obviously its being the capital of Assam. In 2011-12, 18 districts of Assam were below the all Assam average and Baksa had the minimum (2.3%) facility of electricity in its school. In 2013-14 also 15 districts were below the all Assam average.

#### 3.1.2 Drinking water

In 2009-10, 78% of primary school and in 2013-14, 80% of primary schools of Assam had drinking facility. But at the district level, the scenario have been very poor – Cachar, Hailakandi, Karbi Anglong, Karimganj and NC Hills (Dima Hasao) were lagging far behind than the other districts. Only 50-60% of schools of these districts had drinking water facility. Lack of water facility might lead to many serious health problems.

#### 3.1.3 Toilet facility

The Supreme Court of India through his verdict on May7, 2009 recommended that all schools must have separate toilets for boys and girls, and also facilities for water for drinking and other purposes – “Separate toilets for girls and boys as well as availability of water are essential for basic human rights that enhance the atmosphere where the education is imparted. It can also be put in the compartment of basic needs and requirements in schools”. But in Assam, only 31% primary school had separate girls’ toilet in 2009-10. This figure increased to 79% in 2013-14. Only 11 districts of Assam are above the all Assam average in 2013-14 but the girl students of rest 16 districts have been suffering from not having a proper toilet for them.

#### 3.1.4 Kitchen Shed

Mid-day meal is a Government scheme to encourage the poor family children for coming to school for education. This policy was implemented in 2004. Since then primary schools have been instructed for making provision to facilitate students with nutritious meal during school tiffin time. In 2009-10, 62% school had kitchen shed to prepare the midday meal and rest 38% did not. The situation was slightly better in 2013-14 where 74% of primary school of Assam had this facility; while those in 12 districts were still below this average. The situation was worst in Karbi-Anglong where only 45% schools had sheds for cooking.

**Table 1: Availability of facilities of the primary schools in Assam till 2013 – 14 (as accessed from DISE reports of 2009 – 10 to 2013 – 14)**

Districts	No of Schools		Electricity #		Drinking Water		Girls Toilet		Common Toilet		Kitchen Shed	
	2009 – 10	2013 – 14	2011 – 12	2013 – 14	2009 – 10	2013 – 14	2009 – 10	2013 – 14	2009 – 10	2013 – 14	2009 – 10	2013 – 14
Baksa *	No data	1499	2.3	3.4	No data	85.3	No data	76.5	No data	64.1	No data	67.9
Barpeta	2246	2062	2.9	9.3	97.8	92.14	50.4	70.1	31.1	59.5	74.6	75.8
Bongaigaon	1303	862	4.8	7.7	81.2	81.1	45.2	54.0	37.0	45.3	46.5	67.3
Cachar	1959	2104	6.7	6.0	62.1	66.4	44.4	78.6	16.3	52.7	83.5	84.8
Chirang *	No data	852	5.0	6.2	No data	85.3	No data	73.5	No data	42.5	No data	65.2
Darrang	2185	1125	6.5	12	75.3	90.7	44.3	76.7	42.2	60.3	64.5	73.1
Dhemaji	1188	1313	2.7	4.8	80.5	82.4	24.3	73.6	12.5	51.9	62.9	92.0
Dhubri	1750	2250	3.6	4.8	80.3	65.2	29.3	58.4	44.1	38.6	59.9	70.1
Dibrugarh	1556	1595	13.2	13.5	95.8	96.6	43.1	87.3	32.4	73.2	82.3	79.5
Goalpara	1348	1537	8.1	12.9	85.7	84.6	44.6	95.4	08.1	97.8	60.3	75.8
Golaghat	1267	1356	8.4	9.8	93.0	95.0	20.8	76.5	74.4	70.7	60.9	75.8
Hailakandi	1123	1238	2.5	1.5	53.6	21.1	17.5	31.9	34.7	16.7	69.2	75.0
Jorhat	1850	1778	13.8	15.5	97.3	95.8	31.9	95.8	59.6	76.5	80.3	81.8
Kamrup Metro *	No data	547	33.7	36.5	No data	85.8	No data	90.8	No data	70.6	No data	66.4
Kamrup / Rural	2604	1988	33.7	4.8	91.8	86.6	36.2	90.2	91.8	86.6	71.9	83.4
Karbi Anglong	1959	1856	3.3	12.0	50.0	60.9	34.4	94.3	20.8	74.8	19.5	45.1
Karimganj	1563	1762	2.8	6.4	59.9	56.7	9.7	74.5	29.6	61.8	58.9	66.1
Kokrajhar	1745	1787	4.3	5.1	78.6	68.0	22.6	66.6	26.8	45.7	31.1	56.7
Lakhimpur	1695	1848	3.8	6.2	85.3	85.1	2.9	73.2	33.6	37.6	61.7	76.0
Marigaon	1146	1262	4.7	5.0	90.3	94.4	21.8	88.0	58.9	80.3	55.9	79.5
N C Hills / Dima Hasao	824	789	4.0	4.9	33.3	36.6	14.3	97.0	17.2	34.0	19.6	73.9
Nagaon	2596	2724	8.3	11.9	88.3	92.6	44.3	78.6	23.3	54.0	69.1	75.9
Nalbari	1862	1029	5.7	10.9	86.5	95.2	49.8	81.4	70.5	62.3	76.3	95.6
Sivasagar	1859	1943	2.3	7.7	98.0	96.5	15.7	97.7	35.9	75.8	85.4	84.2
Sonitpur	2006	2047	8.8	9.4	90.0	84.1	29.4	75.7	41.6	79.2	58.7	75.0
Tinsukia	1253	1293	7.5	17.6	93.8	96.4	45.2	84.7	62.5	84.7	80.8	78.2
Udalguri *	No data	1201	15.3	4.5	No data	82.4	No data	99.9	No data	99.4	No data	66.1

\* Baksa, Chirang, Kamrup Metro and Udalguri are declared as Districts later, hence no data for the year 2009 – 10 is available for them.

# Data of Electricity found from the year 2011-12 only; electricity is still a major constraint for the primary schools of Assam



## 4 Ergonomic Design Recommendations

Ergonomics is concerned about how working conditions, machines and equipment can be arranged in such order that people can work with them more efficiently and safely. Human factors and ergonomics research is presently emerging very fast with diverse applications. Health issues are long being a matter of concern for such type of research. The study of ergonomic in case of human health has been studied in various working environment, like health sector, Oil industries, factories, farms, computer field etc. while Pascale et al. (2015) reviewed human factors and ergonomics in health care sector, Vischer (2007) has proposed a theoretical model of the worker–workspace relationship in which stress and comfort play a critical part; and Zend et. al. (2014) has assessed environmental problems faced by flour mill workers and their physiological cost in the Parbhani district of Maharashtra.

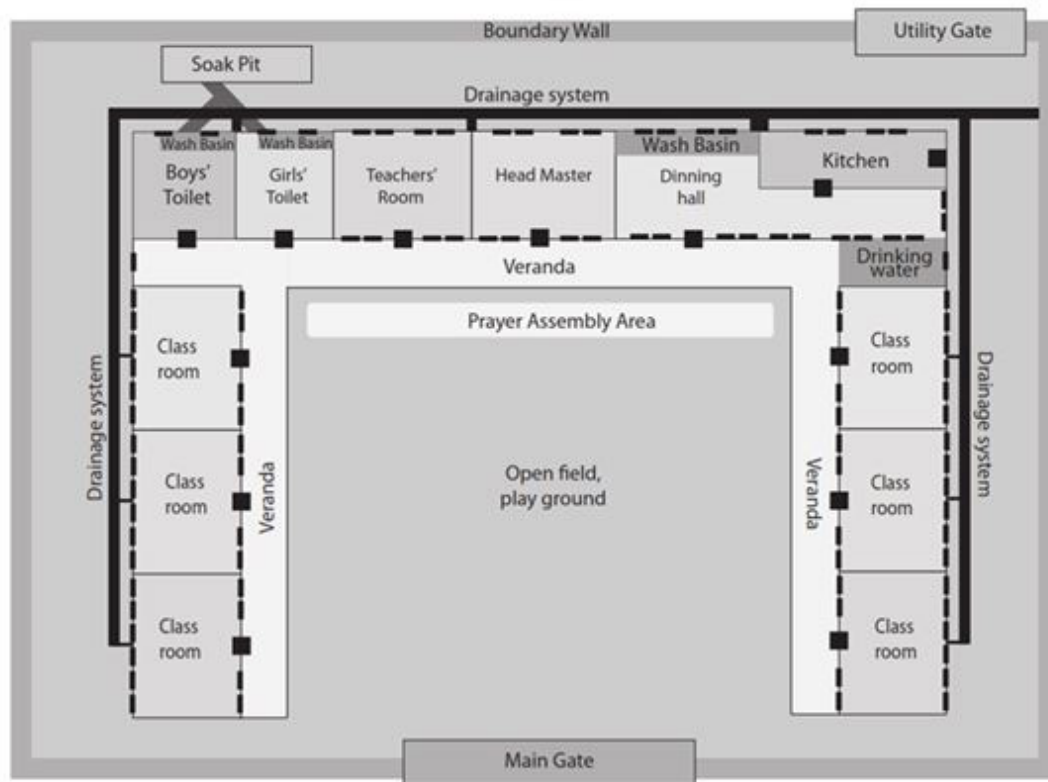


Fig 1. Ergonomic design recommendation of a model primary school campus taking care of all prerequisites to a hygienic education system and healthy atmosphere.

The above diagram represents the possible ergonomic design interventions to provide a better ambience for education to children at primary levels. With reference to Fig 1, we propose the following recommendations:

- The toilet system, separate for boys and girls, should be at a corner of the school building accommodated with a soak-pit to ensure efficient sewage disposal system – the first step to an hygienic environment.



- Options for effective sewage and garbage removal through the utility gate at the backside without hampering the hygiene of the school premise.
- Smooth drainage system to ensure no accumulation of waste or rain water to allow mosquitoes grow anywhere.
- A neat and clean kitchen accompanied with a dining space on the other corner of the school building to ensure food hygiene – a basic requirement of mid-day meal scheme.
- Separate wash basins at toilets and dining space to ensure basic hygienic practices.
- Hygienic drinking water facility with water purification system (preferably non electrical) outside the dining space to ensure safe drinking water to one and all.
- Open playground and prayer / assembly area for the physical and psycho-social development of the children.
- Classrooms with adequate cross ventilation and sufficient illumination through wide glass windows, enabling children to interact with nature simultaneously while studying.

## 5 Conclusion

Today, lot of regulations are in force regarding school health and education. Still there are ample scope for further improvement at all levels of education in Assam, perhaps in a number of other states also. The parameters discussed in this study are highly connected to the psychophysical and socio-cultural growth of the children. Studies have already proved that various cognitive problems occur if these basic facilities are not provided to students. Such problems include stress, absences, drop-outs, diseases like malaria, anemia, poor performance in examination and sports, etc. In this study, we have observed that the districts of Assam are yet to meet their set targets. We hereby attempted to contribute to this.

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