

# Evaluating The Accessibility Of Science Resources At Higher Secondary Schools In Manipur In Line With NEP2020

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## Abstract

The number of students opting for science stream at higher secondary level at Manipur is higher than both arts and commerce combined. As per NEP 2020 science learning should be based on experiential learning therefore well-equipped laboratories and well-developed resources including qualified teachers are required. So this study is an attempt to find the availability of resources for teaching science at higher secondary school in Manipur in line with NEP 2020. The investigator had chosen descriptive survey method for the current study and prepared a questionnaire on basic resources of the school which was filled by the 60 principals of higher secondary schools across Manipur. It was found that private schools have more numbers of classrooms earmarked for science. 81.1% of the higher secondary schools claim that they have built science laboratory in accordance with the standard layout, 64.2 % of higher secondary schools are having separate laboratory attendant for each laboratory, 18.9% of schools have received complaints about insufficient laboratory, 54.7% of the schools have 1 to 5 teachers for science teaching, only 52.8% of higher secondary school's principals are satisfied with science education in Manipur.

**Keywords:** resources, teaching, science, higher secondary school

Date of Submission: 10-04-2026

Date of Acceptance: 20-04-2026

## I. Introduction

School plays a very important role in imparting formal education. In order to implement the aims and objectives of education as envisaged by the national curriculum framework and National Education Policy 2020, schools required to have basic infrastructure. Resources in school include both the physical infrastructure and human resources. The basic resources refer to a school building, classrooms, playground, furniture, water supply and sanitation, library, laboratory, teachers and other non-teaching staff etc. Therefore to provide quality science education at higher secondary level, the available of resources are one of the indicating factors. The science teachers, the laboratory attendant, the students are an important part of science education. The quality of teaching and learning of science mainly depends on resources availability. At present many schools in Manipur lack in basic resources including trained teachers. Science education without proper infrastructure and ill-equipped laboratory will not make the desired citizen which we expect. In Manipur the number of students opting for science stream at higher secondary level at Manipur is higher than both arts and commerce combined. As per the record of Council of Higher Secondary Education Manipur the percentage of students enrolled in class XI in the three stream arts, science and commerce are given below in table 1.

**Table 1: Students enrolment in XI standard in difference stream from 2020-2024**

Year	Science		Arts		Commerce		Total
	Male	Female	Male	Female	Male	Female	
2020	10679	10514	4601	4621	396	322	31133
2021	10274	10166	4419	4388	345	294	29886
2022	12972	13330	7265	6673	498	391	41129
2023	11751	11849	5143	4320	366	290	33719
2024	10868	10910	4147	4214	276	285	30700

Source: Council of higher secondary education Manipur

This indicates that many students and parents preferred science subject over the two stream arts and commerce but science teaching cannot be limited to classroom lecture. Therefore, *the facilities need to be substantially more advanced for the secondary and senior secondary stages, with well-planned laboratories, preferably Internet and multimedia facilities (at least for teachers) and a well-stocked library containing also career information materials....Uneven distribution of infrastructure facilities in schools creates a large divide between them compromising the basic tenet of equality of opportunity enshrined in our constitution. Lack of*

facilities also has had another negative consequence. It has exerted pressure on curriculum designers and textbook writers to suit their work to the poor scenario of facilities and motivation. This in turn has led to a belief that space and practical work are luxuries, not essentials for science teaching. This cycle must be broken somewhere (The NCERT position paper on teaching of science page -17).

It is widely accepted by educators that availability of resources in school has a positive impact on students learning. In Manipur there are 235 higher secondary schools out of which 178 (75.74%) school offer science stream at higher secondary level. Many schools are lacking in basic resources. Laboratories are only for name sake and library are non-functional in most of the school. Such lack of equipment in laboratories and poor infrastructure will hinder in giving quality science education.

### Significance of the Study

Students enrolled in science subject at higher secondary level in Manipur outnumbered the total number of students taking arts and commerce. Many schools do not have well-equipped laboratories. Libraries are non-functional in most of the school without library staff and relevant books. Science learning cannot be done in classroom alone at the higher secondary level a well-equipped laboratory is required where students will be developing their observational, experimental, manipulation, interpretation skills. In most of the school the laboratory are functioning without laboratory attendant which give extra burden to teachers. Therefore the study is carried out to find out the availability of resources for teaching science at higher secondary level.

### Objective

The objective of the study is

1. To assess the availability of resources for teaching science at higher secondary schools in Manipur
2. To suggest measures for improving science education in Manipur

## II. Methodology

The investigator had chosen descriptive survey method for the current study. The investigator prepared a questionnaire on basic infrastructure of the school which was filled by the Principals of higher secondary school science with stream.

### Sample:

The sample consists of 60 principals from 60 higher secondary schools with science stream at higher secondary level.

## III. Data Analysis And Interpretation

The data obtained was analysed to describe the data in form of percentage and interpreted accordingly.

**Table 2: Total no. of classrooms for science stream (in per cent %)**

≤ 2		3 to 5		More than 5	
38.3		20.0		41.7	
Govt	Private	Govt	Private	Govt	Private
34.8	65.2	25.0	75.0	24.0	76.0

The above table 2 shows that, out of 60 higher secondary schools 38.3 % have less than and equal to two (2) rooms for science class, 20% have three (3) to five (5) classrooms for science and 41.7 % have more than five (5) classrooms for science out of which 76% belongs to private schools. Private schools have more numbers of classrooms for science, this indicate that more students are enrolled in private schools for learning science.

**Table 3: Classroom with projector (in per cent %)**

Yes		No	
35.8		64.2	
Govt	Private	Govt	Private
5.3	94.7	41.2	58.8

The table 3 shows that only 35.8% of schools have projector in the classrooms out of these schools 94.7 are private schools, which indicate that most of government schools do not have modern ICT enabled classrooms. 64.2 % of schools do not have projector in their classrooms.

**Table 4 Classroom with smart board (in per cent %)**

Yes	No
24.5	75.5

Govt	Private	Govt	Private
0	100	37.5	62.5

Table 4 indicates that 24.5% of higher secondary schools have smart board and all of them are private schools, this indicates that private schools used advance ICT enabled classroom to attract more students. 75.5 % of the higher secondary schools do not have smart board.

**Table 5: Safe drinking water for teacher, non-teaching staff and students (in per cent %)**

Yes		No	
84.9		15.1	
Govt	Private	Govt	Private
27.9	72.1	33.3	66.7

Table 5 shows that 84.9 % of higher secondary schools provide safe drinking water for teacher, non-teaching staff and students out of which 72.1% are private schools.

**Table 6: Separate toilet for boys and girls (in per cent %)**

Yes		No	
94.3		5.7	
Govt	Private	Govt	Private
28	72	33.3	66.7

Table 6 shows that 94.3% of schools have separate toilet for boys and girls out of which 72% are private schools and 28% are government schools.

**Table 7: Schools having Library (in per cent %)**

Yes		No	
90.6		9.4	
Govt	Private	Govt	Private
29.2	70.8	20	80

Table 7 indicates that 90.6% of higher secondary schools have library out of which 70.8% are private schools and 29.2 % are government schools. Only 9.4% of higher secondary schools do not have library.

**Table 8: Schools having the photocopying/xerox facility available in the library (in per cent %)**

Yes		No	
76.7		23.3	
Govt	Private	Govt	Private
19.6	80.4	58.3	41.7

In the table 8 it is found that 76.7% of higher secondary schools provide photocopying/xerox facility for students and teachers out of which 80.4% are private and 19.6 are government schools. It also shows that 23.3 % of higher secondary schools do not provide any photocopying/xerox facility for students and teachers.

**Table 9: Schools having sufficient reading desk and benches in the library (in per cent %)**

Yes		No	
77.36		22.64	
Govt	Private	Govt	Private
19.6	80.4	57.1	42.9

Table 9 indicates that 77.36% of higher secondary schools provide sufficient reading desk and benches in the library out of which 80.4% are private and 19.6 are government. It also shows that 22.64% of higher secondary schools do not have sufficient reading desk and benches in the library.

**Table 10: Schools having internet browsing facilities in the library (in per cent %)**

Yes		No	
55		45	
Govt	Private	Govt	Private
12.1	87.9	44.4	55.6

Table 10 indicates that 55% of higher secondary schools provide internet browsing out of which 87.9% are private and 12.1% are government. It also shows that 45% of the higher secondary schools do not provide internet browsing facilities.

**Table 11: Schools having sufficient reading resources in the library (in per cent %)**

Yes		No	
75		25	
Govt	Private	Govt	Private
20	80	53.3	46.7

Table 11 shows that 75% of the higher secondary schools have sufficient reading resources in the library, out of which 80% are private and 20% are government. While 25% do not have sufficient reading resources out of which 46.7% are private and 53.3% are government.

**Table 12: Schools supplying newspaper in the library (in per cent %)**

Yes		No	
75		25	
Govt	Private	Govt	Private
17.8	82.2	60	40

Table 12 shows that 75% of the higher secondary schools have newspaper available in the library out of which 82.2% are private schools and 17.8 % are government schools. Further 25% of the higher secondary schools do not have newspaper available in the library.

**Table13: Book lending service for students and teacher in the library (in per cent %)**

Yes		No	
78.3		21.7	
Govt	Private	Govt	Private
23.4	76.6	46.2	53.8

Table 13 indicates that 78.3% of higher secondary schools provide book lending service for students and teacher out of this 76.6% are from private and 23.4 are government. Further 21.7% of higher secondary schools do not provide book lending service for students and teacher.

**Table 14: Reference Section available in the library (in per cent %)**

Yes		No	
41.66		58.33	
Govt	Private	Govt	Private
12	88	40	60

Table 14 shows that 41.66% of the higher secondary schools have reference section in their library out of which 88% are private and 12% are government.

**Table 15: Library staff available in the library (in per cent %)**

Yes		No	
45		55	
Govt	Private	Govt	Private
11.1	88.9	42.4	57.6

Table 15 shows that 45% of the higher secondary schools have library staff available in the library out of which 88.9 % are private and 11.1% are government schools. Further 55% of the higher secondary schools do not have library staff available in their library.

**Table 16: Schools having separate laboratory for physics, chemistry and biology (in per cent %)**

Yes		No	
94.3		5.7	
Govt	Private	Govt	Private
33.3	66.7	0	100

In table 16, 94.3% of the higher secondary schools have separate laboratory for physics, chemistry and biology subjects out of which 66.7% are private 33.3 are government schools. Only 5.7 % of the higher secondary schools do not have separate laboratory for physics, chemistry and biology subjects in their schools.

**Table 17: Building of science laboratory in accordance with the standard layout (in per cent %)**

Yes		No	
81.1		18.9	
Govt	Private	Govt	Private

23.3	76.7	50	50
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In the above table 17, 81.1% of the higher secondary schools claim that they have built science laboratory in accordance with the standard layout given by the council of higher secondary education Manipur out of which 76.7% are private and 23.3% are government.

**Table 18: Capacity of the laboratory**

Name of the laboratory	How many students can be accommodated at a time (in numbers)									
	10-20		21-30		31-40		41-50		50-60	
Biology	33.9		45.3		13.2		5.7		1.9	
	Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt
	27.8	72.2	20.8	79.2	71.4	28.6	0	100	0	100
Chemistry	34.0		47.2		7.5		9.4		1.9	
	Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt
	27.8	72.2	24.0	76.0	50.0	50.0	40.0	60.0	0	100
Physics	34.0		47.2		11.3		5.7		1.8	
	Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt
	27.8	72.2	24.0	76.0	66.7	33.3	0	100	0	100

From the above table 18, 33.9% of schools can accommodate 10-20 students, 45.3% of schools can accommodate 21-30 students, 13.2% of schools can accommodate 31-40 students, 5.7% of schools can accommodate 41-50 students and 1.9% of schools can accommodate 50-60 students at a time in the biology laboratory. 34% of schools can accommodate 10-20 students, 47.2% of schools can accommodate 21-30 students, 7.5% of schools can accommodate 31-40 students, 9.4% of schools can accommodate 41-50 students and 1.9% of schools can accommodate 50-60 students at a time in the chemistry laboratory. 34% of schools can accommodate 10-20 students, 47.2% of schools can accommodate 21-30 students, 11.3% of schools can accommodate 31-40 students, 5.7% of schools can accommodate 41-50 students and 1.8% of schools can accommodate 50-60 students at a time in the physics laboratory.

**Table 19: Schools having separate laboratory attendant for each laboratory (in per cent %)**

Yes		No	
64.2		35.8	
Govt	Pvt	Govt	Pvt
23.5	76.5	36.8	63.2

From the above table 19 it is found that 64.2 % of higher secondary schools are having separate laboratory attendant for each laboratory, out of which 76.5% are private schools and 23.4% are government schools. 35.8% do not have separate laboratory attendant for each laboratory viz biology, chemistry and physics subject.

**Table 20: Total no. of laboratory attendant (in per cent %)**

No lab attendant available	1 attendant	2 Attendant	3 Attendant	4 attendant	5 attendant
26.42	9.43	7.55	37.73	11.32	7.55
Govt	33.7	40	25	16.7	25
Pvt	64.3	60	75	83.3	75

From the above table 20, it is found that 26.42% of the schools do not have lab attendant out of which 64.3% are private schools, 9.43% of schools have only 1 attendant, 7.55% have 2 attendants, 37.73% have 3 attendants, 11.32% have 4 attendants and 7.55% have 5 lab attendants respectively.

**Table 21: Complaint received by school related to laboratory (in per cent %)**

Yes		No	
18.9		81.1	
Govt	Pvt	Govt	Pvt
60	40	20.9	79.1

From the above table 21, it is found that 81.1% of the higher secondary schools do not received complaints related to laboratory only 18.9% of schools have received complaints related to laboratory out of which 60% are government, 40% are private.

**Table 22: Number of Science Teachers in the school with B.Ed (in per cent %)**

Subject	Not Available		1 – 5	6 – 10	11 – 15	More than 15
Biology	28.3		54.7	9.4	5.7	1.9
	Govt	6.7	20.7	80	100	100
	Pvt	93.3	79.3	20	--	--
Chemistry	32.0		60.4	5.7	1.9	--
	Govt	5.9	31.3	100	100	--
	Pvt	94.1	68.7	--	--	--
Physics	35.8		58.5	5.7	--	--
	Govt	10.5	32.3	100	--	--
	Pvt	89.5	67.7	--	--	--

From the above table 22, 54.7% of the higher secondary schools have 1 to 5 teachers, 9.4% schools have 6 to 10 teachers, 5.7% schools have 11 to 15 teachers and only 1.9% schools have more than 15 teachers with B.Ed degree respectively for teaching biology subject. 60.4% of schools have 1 to 5 teachers, 5.7% schools have 6 to 10 teachers and 1.9% schools have 11 to 15 teachers respectively with B.Ed degree for teaching chemistry subject. 58.5% of schools have 1 to 5 teachers and 5.7% schools have 6 to 10 teachers respectively with B.Ed degree for teaching physics subject.

**Table 23: School facing shortage of teacher (in per cent %)**

Yes		No	
20.8		79.2	
Govt	Pvt	Govt	Pvt
72.7	27.3	16.7	83.3

From the above table 23, it can be seen that 20.8% of higher secondary schools faced shortage of teacher out of which 72.7% are government and 27.3 are private schools. 79.2 % of schools do not face any shortage of teachers. Out of these 83.3 are from private.

**Table 24: Principals satisfaction with overall resources at Higher Secondary Schools in Manipur (in per cent)**

Yes		No	
22.6		77.4	
Govt	Pvt	Govt	Pvt
8.3	91.7	34.1	65.9

From the above table 24, 22.6% of higher secondary schools principals are satisfied with the overall resources at Higher Secondary Schools in Manipur out of which 91.7% are from private schools. 77.4% of higher secondary schools principals are not satisfied with the overall resources at Higher Secondary Schools in Manipur out of which 65.9% are private 34.1% are government schools.

**Table 25: Principals satisfied with Science Education at Higher Secondary Schools in Manipur (in per cent)**

Yes		No	
52.8		47.2	
Govt	Pvt	Govt	Pvt
21.4	78.6	36	64

From the table 25, it is found that 52.8% of higher secondary schools principals are satisfied Science Education at Higher Secondary Schools in Manipur out of which 78.6% are from private schools. 47.2% of schools principals are not satisfied Science Education at Higher Secondary Schools in Manipur.

**Table 26: Principal’s level of satisfaction on Science Education in Manipur (in per cent %)**

To a great extent		To some extent		To little extent		Not at all	
15.1		15.1		3.8		66.0	
Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt
0	100	12.5	87.5	100	0	34.3	65.7

From the above table 26, it is found that 15.1% of the higher secondary school principals expressed their level of satisfaction on Science Education in Manipur as to a great extent, 15.1% of the school principals expressed to some extent, 3.8% of the school principals expressed to little extent and 66% of the school principals expressed not at all. The number of principals who have expressed 'not at all' are more than the numbers who are satisfied to a great extent.

#### **IV. Discussion**

NEP 2020 makes many important recommendations on science education. From class 6 to 8 would be more indulged in experimental learning to increase the reasoning of the child which is the main focus of the policy. Class 9 to 12 would be disciplinary classes where students would be given more choices. It is also mentioned of evidence-based reasoning and the scientific method to be incorporated throughout the school curriculum in science. NCERT position paper on science teaching (2006) mentioned experiments are the hallmark of science, and for science learning, they are essential. So in the context of NEP 2020 and NCERT position paper on science teaching (2006) experiential learning are important for teaching and learning science therefore higher secondary school offering science should be well equipped with resources. In in context of the present study, only 41.7 % have more than five (5) classrooms for allotted for science, it could mean the class could be congested. Most of the laboratory seems to be small as 33.9% of schools can accommodate 10-20 students, 45.3% of schools can accommodate 21-30 students, 13.2% of schools can accommodate 31-40 students, 5.7% of schools can accommodate 41-50 students and 1.9% of schools can accommodate 50-60 students at a time in the biology laboratory and 64.2 % of schools are having separate laboratory attendant for each laboratory which could means the rest of the school are managing with insufficient laboratory staff. 54.7% of schools have 1 to 5, 9.4% have 6 to 10, 5.7% have 11 to 15 and 1.9% have more than 15 teachers with B.Ed degree respectively for teaching biology subject. 60.4% of schools have 1 to 5, 5.7% have 6 to 10 and 1.9% have 11 to 15 teachers respectively. In this regards, Tiwari (2002) in a study on the infrastructure found that the school have only theory class for science but no practical classes. In the same study it was also found that qualified science teacher were low in rural area and urban school were better equipped in comparison to rural schools. Singh K P (2019) in his study on the quality of science teaching in secondary schools of eastern UP also found that the resources for science teaching are in bad stage. Asaju O (2012) in study on infrastructure in public secondary school found that 99.4% of respondents agreed that the adequacy of infrastructure is important in delivering quality education. 91.9% of the respondents agreed that inadequate funding, lack of regular inspection and regular maintenance of infrastructure is responsible for the prevalent infrastructural deterioration in secondary schools. In the presents study 52.8% of schools principals are satisfied Science Education at Higher Secondary Schools in Manipur but 47.2% of schools principals are not satisfied Science Education at Higher Secondary Schools in Manipur. So a large number about 47.2% schools are not satisfaction. Therefore there should be frequent inspection to check if schools are complying with the current norms and standard.

#### **Measures:**

Few measures that can be taken up to improve science education in Manipur

1. Frequent inspection of school to check if school comply with the standard and norms.
2. Training and workshop for teachers
3. Organising science exhibitions and fairs for students
4. Regular supply of equipment in the laboratory
5. Replacement of chemicals regularly
6. Appointment of laboratory attendant and library staff
7. Maintenance of school building on regular basis.

#### **V. Conclusion**

In the state Manipur most of the students prefer to study science at higher secondary level but to impart quality science education it requires well equipped laboratories with good human resources. It is also seen during the data collection that some school have room for laboratory but without any apparatus or equipment for conducting practical. Some principals have claimed of having problems in the laboratory for example not having enough apparatus, space problems, no lab attendants in the laboratory and even after writing so many letters to the competent authority their problems are not resolved. As the study involved collecting the data from the principal it may not give the real picture of what is the current status in the schools. The data should also be collected from the students to find the problem the students are facing because many statements of students contradict the findings. Therefore to make the science learning more experiential the schools need to take feedback from the students also regarding the facilities students are getting from schools.

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